



FRIDAY, FEB. 7.

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Contributions.

The Dutch Kills Drawbridge Accident.

Long Island Railroad Co.,
LONG ISLAND CITY, N. Y., Feb. 18, 1890.

TO THE EDITOR OF THE RAILROAD GAZETTE:
I notice in your comment on this accident [*Railroad Gazette*, Jan. 31, p. 78] you say we might learn a profitable lesson from the New Haven road in the matter of derailing switches. I would like to say just one word on this point. We are already, and have been for a long time, protected by derailing switches at junction points and drawbridges with the exception of this particular one. At this point the roadbed is on a fill, running along the side of the creek for some distance up to the draw. A derailing switch would, therefore, either throw the west-bound train into the creek on one side or into the opposite main track on the other side.

AN OFFICER.

[Knowing nothing of the ground, of course we cannot judge whether or not an additional width of embankment, to provide for a derailing switch at this particular point, would have been justifiable or practicable. Moreover, we should not advocate the introduction into main line tracks of derailleurs, or any other facing points, without careful provisions to make the switch itself safe. But with proper precautions the derailer becomes a most important auxiliary, as was shown in the accident on the New Haven road referred to. If it is important anywhere, it must be so at drawbridges. But drawbridges are usually approached by embankments or trestles or fixed spans, and the question where to put the throw-off switch becomes an awkward one. If it is placed a long distance back we have two danger points instead of one, as the engineer may "lose his head" after passing it. If it is placed close to the draw the expense of building a proper spur track upon which to guide the train and stop it becomes a serious problem. It is not fair, however, to assume that this expense is always unjustifiable. The name of the bridge tender who saved the Long Island train was George W. Lynch, instead of McKedy, as given last week.—EDITOR RAILROAD GAZETTE.]

Radius Bars of Engine Trucks.

RIDGEWOOD, N. J., Jan. 20, 1890.

TO THE EDITOR OF THE RAILROAD GAZETTE:
Will you kindly make known through the columns of the *Railroad Gazette* the latest figures for train resistance per ton; also the most popular rule for finding radius of any truck?

G. L. M.

To make a complete answer to our correspondent would require much space, as the train resistance per ton varies with the many different conditions under which cars are operated. However, we hope shortly to present some information which will start him right.

Regarding the best length of radius bars for engine trucks there is some dispute. The length which will keep the axle always in a line normal to the curve, that is, in a line parallel to the radius of the curve through the point where the axle is located, and which is the proper position to prevent one wheel from getting ahead of the other in going around a curve, is given by the following rule: Multiply the rigid wheel

base by the distance from the first flanged driver to the centre of the truck. Add to this the square of the distance from the first flanged driver to the centre of the truck, and divide the whole by the sum of the rigid wheel base, and twice the distance from the front flanged driver to the centre of the truck. The result will be the length of the radius bar which will keep the axle of the two-wheel truck normal to the curve. Some designers still contend that it is better to use a shorter distance than this, in order to make the outside wheel lead the inside wheel, expecting to produce in this way a crowding action of the truck toward the inside of the curve, which will pull the front end of the locomotive laterally and guide it better around curves. The amount of reduction advised varies from 5 to 20 per cent. But the value of this modification has not been proved, and a safe rule to follow is the one given above, which keeps the axle normal to the curve. It may be that the shortening of the radius bar to a length less than that indicated by this rule would decrease the flange wear on the outer wheel; but we do not know of accurate investigation which substantiates beyond question the value of such a modification.—EDITOR RAILROAD GAZETTE.]

Suburban Railroad Service.

TO THE EDITOR OF THE RAILROAD GAZETTE:

Recent writings in the *Railroad Gazette* on the above subject lead me to offer a modest contribution to the discussion. As you well know, my duties for many years forced some of its problems upon my attention. Speaking generally, I would say that he who studies the problem of suburban railroad service soon reaches the conclusion that satisfactory results are reached only by strict attention to details.

Some general principles may be stated as follows: Free ingress and egress to the cars should be provided, and if extra long ones are used, by openings other than the end doors.

The line should be so arranged as to give safety from passing trains and avoid the necessity of stopping one train for another that may be at a station.

All unnecessary weight of rolling stock should be eliminated, and as there is likely to be little or no reduction in the weight of cars except by radical changes, we must look for reform elsewhere.

It is better to increase the number of trains than of the cars on a train, and in some cases shorten the length of trips and thus reduce the hauling, stopping and starting of empty cars.

The power of the locomotive being ruled by its effective weight, it follows that it must be large to meet present demands, and every effort should be made to produce such forms as carry with them the least dead or non-effective load. While this is true of all train service, it is especially so of suburban, as the greatest outlay of power is at starting, which outlay is oft repeated.

In the years past much of the suburban work was done by locomotives outgrown and cast off from other service. In these, as in all eight-wheel locomotives, the relation of effective to total weight, including the tender, was often as low as one to 2.8. Locomotives of the Forney type give excellent results for short runs with frequent stops, and are extensively used abroad. The proportion of effective to total weight is as one to 1.06, and with coal pockets and water cranes judiciously located can be reduced to one to 1.5. This class does good service as double-enders, though when run with the drivers forward is hard on the rails at sharp and bad-conditioned curves, which curves, however, on the ideal railroad, are not supposed to exist. The Forneys, when run with the drivers forward, do good work in crusted snow and ice, crushing out the obstruction over which the light-loaded truck wheels of the eight-wheel locomotive would ride or become stalled. They also admit of large truck wheels under the tank, which is ever desirable, and the outside bearings are within easy reach. Some attempts have been made to improve the Forney by placing a pair of leading wheels under the smoke box, which is on the whole a disadvantage, and reminds one of the country doctor who rendered a will against the estate of a deceased patient for curing him till he died.

The class referred to by your correspondent "G. B." [*Railroad Gazette*, Jan. 24], as extensively used abroad, is simply an eight-wheel locomotive with water tanks over the drivers and a coal box on an extension of the frame behind the footboard. It is light forward; the truck wheels are small and have inside bearings. A class much in favor abroad has two pairs of drivers with the fire box between the axles. The frame is extended, and on the extension are a coal pocket and small water tank. Water is also carried in tanks over the drivers. There is a pair of 42 or 45-in. wheels, with radial boxes for their axles, at each end and at equal distance from the drivers, thus forming a perfect double-ender, which passes very smoothly and easily through the frogs and switches.

American designers would object to the crank, and to overcome this objection the Rhode Island Locomotive Works some time since designed a locomotive of much the same type. The cylinders, which were outside, were placed back very near the front drivers and connected to the back ones. Front and back there was to be a

pair of 42-in. carrying wheels with radial boxes. This, like its English prototype, had side and back tanks, and would pass freely through curves of short radius. Through a change in the management of the road for which it was designed, it was not built.

The indications are that for the present the locomotive must answer for all of the shortcomings of the suburban service.

TAGHCONIC.

Illinois Society of Engineers and Surveyors.

The fifth annual meeting of the Illinois Society of Engineers and Surveyors was held in the City Hall of Peoria, Ill., Jan. 29, 30 and 31. The prevailing epidemic interfered with the attendance, but, notwithstanding this, the sessions were full of interest, and the papers and discussions were complete and valuable.

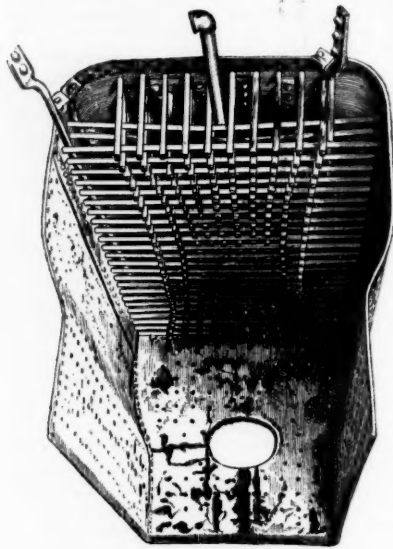
Of the papers in the line of railroad work, the one on Sharp Curves, by Edwin A. Hill, of the C., C. & St. L., Cincinnati, was the most valuable. Mr. Hill said that it is undoubtedly true that certain well-grounded objections to the unnecessary use of curves, more particularly sharp ones, on the main line track have led to an undue prejudice against their use generally; a prejudice which often disregards the exigencies of special cases and loses sight of the real limitations to their use. Particularly is this the case with yard work and around large towns and cities. He showed in detail the different requirements in handling single cars and trains on curves, giving rules by which the minimum radius and the necessary widening of gauge may be found. Among the many instances of sharp curves on main line was one on the Chicago division of the C., C. & St. L. of 240 ft. radius (24-degree curve), over which the entire traffic of the line passes. Many main-line curves of radius as low as 187 ft. radius were mentioned. Of sidings, cases where 80 and even 50 ft. radius had proved practicable were given. The placing of guard rails was also discussed. Mr. Hill said that he should have no hesitancy in employing curves of 100 ft. radius in yard work, to be operated by pony engines, and also curves of 60 and 50 ft. radius, to be operated by switch-ropes or horses, provided the exigencies of the case strongly demanded them, not that they seem advisable, but rather that they can be tolerated if absolutely necessary. Curves of these short radii should be put in with exceeding great care and pains to make the elevation and curvature regular; and the necessary amount of gauge widening and the proper setting of guard rails should be carefully worked out according to the demands of the rolling stock likely to be used thereon. While curvature should always be made as light as possible to avoid excessive wear of rails and tires and danger of derailment from cars with sharp flanges, these objections should not for a moment be weighed against very considerable expense for land purchases to avoid sharp curvature, nor should they prevent access to any warehouse or manufacturing establishment which it is really desirable to reach. Never hesitate to use any radius really necessary to accomplish the end in view. The paper contained valuable data from experience of different roads in using sharp curves, both on main line and in yards, as well as a theoretical consideration of the subject.

Prof. I. O. Baker, of the University of Illinois, in his Notes on the Use of Mortar, made a plea for the more general use of cement mortar in buildings and small engineering constructions, in preference to the cheaper lime mortar, and discussed the question of the relative value of Portland and Rosendale cements for various degrees of mixing. He advocated the use of a solution of alum and soap in mixing mortar for all cases where it is necessary to make the masonry impervious to water.

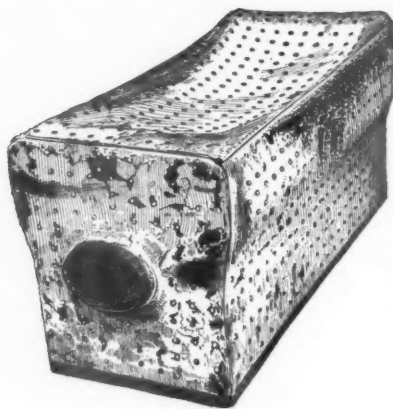
Charles Hansel, Consulting Engineer of the State Railroad Commission, Springfield, gave a paper on Interlocking and Signaling. The provisions of the Illinois law allow the railroads of the state to use interlocking and not come to a stop, the system first being approved by the Railroad Commission. It seems to be the design both of railroad managements and the builders of interlocking to provide the most complete and efficient devices known to science, rather than to put in only such as they think might be approved by the commissioners. Of the total 551 interlocking machines in the United States, 52 are in Illinois. Of the 7,090 levers used for interlocking in the United States, 607 are in Illinois, divided as follows: 500 Saxby & Farmer, 3 Stevens, 8 horizontal levers, 80 hydraulic levers, 6 Westinghouse pneumatic, and 10 crank levers. Mr. Hansel described the general construction and methods by which the systems are operated, and added a review of those for block signaling. He deprecated the lack of uniformity of codes of signals, and advocated a congress of railroad managers to select and adopt a uniform code. The signal engineer has before him a field full of possibilities, and replete with problems worthy of his best skill.

S. F. Balcom, of the Illinois Central Railroad, reviewed the construction of the Cairo bridge over the Ohio River and described the terminal facilities at Mounds station.

S. C. Colton described the alterations in the Washington street tunnel, of Chicago. While repairing this tunnel in order that the West Chicago cable road may use it, the roof has been lowered 3 ft. to give greater depth for navigation. The partition wall between the passages has been taken out and placed



Exterior Box.



Interior Box.

AN OVERHEATED BELPAIRE FIRE BOX.

against the outside wall, and the arched roof has been replaced by 20-in. steel I-beams, with centres placed 3 ft. apart, and having an arched filling of brick between, all being covered with a layer of concrete. The clear span of the girders is 20 ft. 6 in. The brick invert was blasted out and the floor placed lower. The conduits for the cable will be placed down in the clay, thus dividing the foundations of the tunnel. It occurs that this may possibly allow a settlement. A novel feature is that the pivot pier and the two abutments of the new bridge will rest directly on the roof of the tunnel. An arch of 6 ft. rise is used instead of the girders in this case. The entire work was executed in open cut, a coffer-dam being constructed to allow work on half of the river at a time.

Among the other papers were the address by the President, C. G. Elliott, on The Engineer and His Work; Iron Substructure for Highway Bridges, by J. H. Burnham, of Bloomington; The New Water Works of Peoria, by W. C. Hawley, of Chicago; Prevention of Abrasion of Creek and River Banks, by E. J. Chamberlain, of Pittsfield. The following topics were discussed: Cost of repairs of railroad pile bridges and average life before renewal; Proper super-elevation of rail on curves; Length of life of ties and relative value of preserving treatment; Jurisdiction of state over railroads in reference to prevention of accidents.

Interesting excursions were taken to the plant and line of the electric railroads, to the water works and to the famous distilleries of Peoria.

The exhibit of drawings and photographs of structures and appliances furnished by the members was varied and attractive, and was one of the best features of the meeting.

The following officers were elected for the ensuing year: President, A. N. Talbot, Champaign; Executive Secretary and Treasurer, S. A. Bullard, Springfield; Recording Secretary, S. F. Balcom, Champaign. The place of the next meeting will be decided by the Executive Board.

Hot Crown Sheets in Belpaire Fire Boxes.

The accompanying illustrations of the interior and exterior fire box of a locomotive indicate in a striking way some of the valuable features of the Belpaire type. They show a fire box which was heated by a careless engineer and fireman running a high-class engine on a first-class road. Such accidents may happen on any road, and the purpose of the illustrations is not to call attention to the accident, but to raise points in favor of the Belpaire fire box.

That the road in question is using good material in its fire boxes is easily understood from the appearance of the cuts. This material was heated so hot that the stay bolts pulled out of the crown sheet, and the crown bent downward, as indicated, about one foot, without showing a fracture at any part of the corners or sides of the box, and no harm was done to the engine, or to the engineer or fireman. As fast as the stay bolts pulled out the steam escaped, doing nothing more than to put out the fire. The threads on the stay bolts were in just as good condition as when originally made. The threads in the sheets were pulled out of shape.

There is some reason to believe that, in a case of this kind, if the fire-box crown had been supported by crown bars, the results would have been a disastrous accident, as the engine was running at the time. There can be but little doubt that this is a fair representation of the results which would follow in any case of a hot crown sheet in a locomotive boiler made with a Belpaire fire box when the sheets are made of good material, and that fact indicates that one of the strongest claims in favor of this kind of box is that it is safer than the ordinary box supported by crown bars. Its accessibility can be readily understood from the view of the interior of the

outer box, and also there can be seen how much less labor is required to remove scale in the case of Belpaire than in the case of the ordinary forms.

Those who are not familiar with the construction of the Belpaire fire box will here find a good illustration of the arrangement of the stays. The peculiar appearance of the sheets of the interior box is due to the incrustation. The steel used in this boiler was thoroughly tested by the mechanical department of the road before it was put into use, and equally good results are being obtained with all materials for boilers on that road, because a high standard has been adopted, and by close inspection the manufacturers are kept within the specified limits.

Hydraulic Forging and the Flow of Solids; Notes Suggested by Alleged Defects in Certain Forgings Made by Pressure.

I.

BY COLEMAN SELLERS, E. D., PROFESSOR ENGINEERING PRACTICE, STEVENS' INSTITUTE OF TECHNOLOGY.

Constructive engineering calls for continual improvement in methods and in appliances for forging or die-shaping iron and steel. Such new methods demand new conditions in the treatment of the metals. Single pieces of great weight may not only need great power in the forging machine, but may require many consecutive operations, the equivalent of the blows of a hammer, to insure good work. Smaller objects pressed in close dies from well-worked bars are finished at one blow, like the output of the drop press. The large forging machines must be compared with the direct-acting steam hammer, and the forging in dies be classed among casting processes, or the flow of solids; pressure taking the place of exceeding fluidity from high temperature; force compelling steel or iron at a moderate heat, or even when quite cold, to flow into the required shape.

In the effort to replace forging under the steam hammer by pressure, the slow-moving hydrostatic press of Bramah has become, by evolution, the quick moving hydraulic forging machine of Sir Joseph Whitworth and others. That of Whitworth, so long hid behind the veil of secrecy, when once exposed, is, so far as principles are concerned, only a great step in advance of forging machines long in use, of less power.

My present consideration of this subject, primarily suggested by my lectures on the subject before the senior class of the Stevens' Institute in the course on Engineering Practice, comes from an observation of defects in certain products of the pressure forging process. My attention has been called to the fact that "there is a strong belief, backed by experience, among several engineers that large forgings made by hydraulic pressure are invariably cold short: that is, are brittle, due to several causes;" that special attention should be given in the study of the subject, "to the character of wrought iron, when forged in large chunks by hydraulic pressure for such purposes as drawbar knuckles, wheels, axles and connecting rods, as these are the parts which must be made of good material in order to stand." It is claimed "that some shapes break as if cast from melted steel in molds, and not as if forged or worked from the hot bar in a press." This last statement assumes that objects cast in steel are not so strong, and are more coarsely granular and brittle, than the same shape forged from steel bars of good quality, and that such shapes when pressed into form at one or two operations lose some of the qualities of the bar from which they are made; or if not showing such deterioration indicate that the amount of work put on the article has not been sufficient to bring the metal into good condition.

In regard to steel castings, it was but a very few years ago that such castings were full of blow-holes and

other defects, and far from meeting the expectations of those who had occasion to use them. The advance in the art of casting steel has been most marked. The manufacture of steel has been brought from the empirical process under trade secrecy into the domain of the exact sciences, and it is the boast of the modern steel maker that he can fill any reasonable specification as to chemical constitution and physical quality in tensile strength, ductility, etc.

Not many years ago I had occasion in designing a machine to require a shape for the frame of a machine. This was to be cast in steel to a specification calling for a given tensile strength for a fixed percentage of elongation as its measure of ductility, and for soundness, as shown in advance of working the mass, by testing its specific gravity; in fact, for all that might be expected from a good steel forging. The casting worked well and seemed sound, but the finished machine when tested under less than its maximum work failed in this casting. The casting broke in a manner that led us to suppose the qualities demanded had not been supplied. Before entering complaint, the casting was cut up and test pieces gave results all on the safe side; the metal was fully up to the specification. We could find no mistake in calculations as to strength and strain, but we did discover a great mistake in the form, and our eyes were opened to the fact that a form well known in machine construction and in common use was faulty in the extreme. (This was the eyebeam in horseshoe form.) A second casting, corrected in shape but not increased in weight, met all the requirements.

Increased confidence is being placed in the output of the steel foundry, even if that confidence has not reached the point of that reposed in steel, improved by working under the hammer or in the rolling mill.

The subject of hydraulic forging as presented to me by the editors of the *Railroad Gazette*, in their desire to benefit the users of such forgings, calls for the consideration of the treatment of both iron and steel. It is now no easy matter to draw a sharp line between homogeneous iron and the low grades of steel that will not harden when heated and suddenly cooled.

I may have occasion to speak of brittleness in both iron and steel. Chemists have shown the cause of cold-shortness in iron that works well hot, but is brittle when cold, and of red-short iron, or that quality of iron so-called, shown by its ductility when cold but exceeding weakness when hot. Mechanics with no knowledge of chemistry know that cold-short iron can be toughened by great work, say by rolling down to small sizes, and they recognize a condition of brittleness that obtains in good fibrous iron after long use and many shocks or strains, as in the chains used on cranes. With the many seeming contradictions the subject becomes complicated and faults are often ascribed to the wrong cause from insufficient care in seeking for the cause of the trouble. Each case may call for separate treatment, and I fear there is no one wide law to be applied to all cases of defective forgings.

To reach the intelligent consideration of forging processes we must consider the effect of work, or of what is equivalent to work, without hammering or rolling. While not prepared to speak positively on this branch of the subject, I wish to direct attention to the observation of an almost single experiment; one, however, which can be readily repeated and proved or disproved by each observer for himself.

A number of years ago a very bright smith went about the country introducing a composition for welding steel, and in selling his process and compound he showed by practice how to use it. The foreman who was under instructions at the fire. In this instance, remarking the high heat to which the steel to be welded under the protection of the compound was raised, said: "Are you not afraid you will burn that steel?" "Burn steel?" was the interrogative reply, "why, man alive, you can't burn steel at that heat; at a higher heat you may melt it, and then perhaps burn it; but we need not melt it for our purpose." Then he undertook to prove his assertion by a simple experiment so full of instruction that I must describe it. He threw down the overheated bar, and let it cool, and when quite black he quenched it and broke off a few inches. The fracture presented the appearance known as *burned steel*. The fine grain and silvery fracture of the best tool steel had gone, and the new fracture was coarse grained, having the look of ingot steel. This called for the usual "I told you so." The teacher then grasped the piece broken off and put it into the fire, brought it to a good heat and plunged it into the water trough. This operation he repeated several times, then breaking the bit in halves, he showed it resorted to its original character of fracture, bright and clear, and fine grained. He claimed that overheating reduced the steel to the conditions obtaining in the cast ingot, but that work of the kind he had put on it, without change of shape, or work that will change shape by hammering or rolling, will do what real work had done in the first place, when by hammering or rolling the coarse-grained ingot steel was made into the fine-grained tool steel. This experiment would indicate that changes of physical condition in steel that are produced by hammering or rolling may be effected by heating and sudden cooling.

In regard to the effect of work in the rolling mill, I may mention that my attention was called to steel plates for the outside shell of marine boilers, made by a

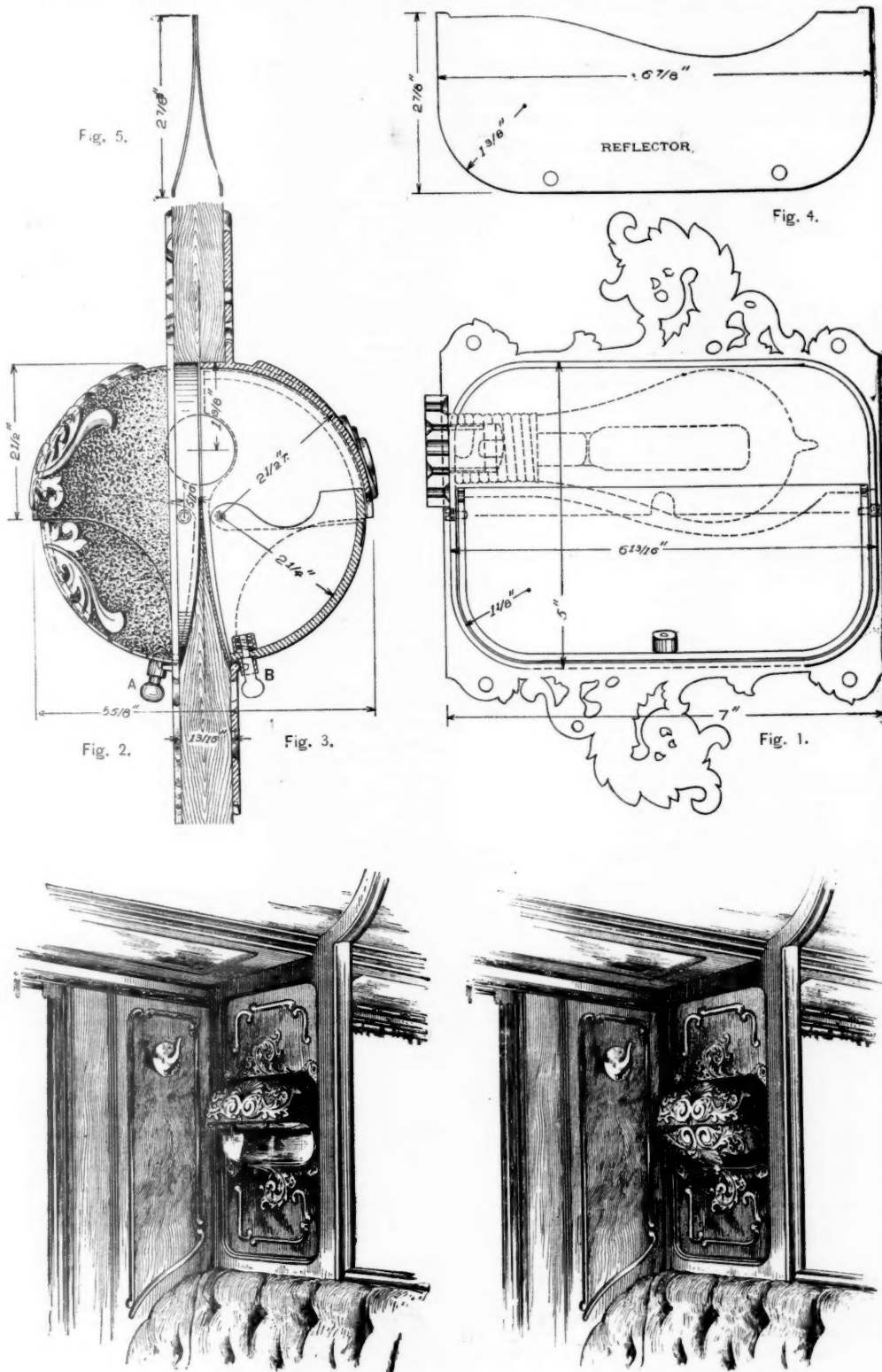


Fig. 6.

Fig. 7.

ELECTRIC READING LIGHTS FOR CARS.

CHICAGO, MILWAUKEE & ST. PAUL RAILWAY.

house of known reputation for the quality of its boiler plate, which failed to meet the requirements of the specification simply because in working from a given sized slab, down to one-inch plate, sufficient work or reduction had not been effected to bring the metal to the required quality. The same metal rolled to half inch was better than the specification called for.

More than forty years ago when I was employed in the Globe Rolling Mill of Cincinnati, O., when all the processes of working iron were empirical in the extreme, and when boiling iron had not yet come to be called puddling, that name having been applied to another process, charcoal blooms were brought from Tennessee, and charcoal pig was made into balls, then hammered or squeezed into blooms to be rolled into "muck bars," ready for piling and rerolling to bar iron. Now and then the result of the puddling was a very cold-short iron, and the worst cases of cold-short condition were rolled into hoops because of the then known fact that brittleness was lost in much working, an effect somewhat like the change in the fracture of steel from that of the ingot to the best bar or plate. One lot of charcoal pig so badly cold-short in the "muck bar" that it could not be sheared without crumbling to bits between the blades of the buyer. That iron, exposed to the air in its pig for

over one year, was ordered to be rolled into hoops. It was reduced to muck bars and found to be as good non-cold-short iron as had ever entered the gates of the mill. Why this change in time? I do not know.

Mr. John Fritz tells of a piston rod of his steam hammer breaking after one year's use and showing a fracture like "pot metal." He blamed the maker. Replacing the rod with a new one made from the best stock with exceeding care, he was surprised to find after a shorter life a fracture as bad, if not worse than the first one. Crane chains must be annealed now and then else they, too, become brittle from long use, subjected to a kind of work that does not improve, but which, on the contrary, injures the iron.

With all these observations on the behavior of steel and iron under work or in manufacture, one learns to be cautious in expressing an opinion as to cause of defective conditions after metal has been worked and has been long in severe use.

After the firm of Sellers & Pennock had patented, in 1818, leather riveted hose for fire engine purposes, my father invented machines for heading rivets, to take the place of the cast rivets used in early experiments. His copper rivets, machine headed, required annealing before use, and his iron rivets before being tinned were also annealed. Without annealing, the heads would fly

off in closing the rivet on the washer. Here was an early example of cold flow of metal, or forging by pressure without heat. Larger machines to make boiler rivets were forging machines on a greater scale, and so on down the years, to the many devices introduced to forge car wheels in Europe, all leading rapidly to the present advance in knowledge and improved facility for such work.

TO BE CONTINUED.

Gibbs' Electric Reading Lights for Cars.

The illustrations herewith show one of the latest novelties in car lighting, and one that is proving a strong attraction to travelers and a good advertisement for the Chicago, Milwaukee & St. Paul. It is a reading and berth lamp, in connection with the system of electric lighting in use on that road. Its general appearance and location are well shown in figs. 6 and 7. In fig. 6 the lamp is shown open and in fig. 7 it is closed. Its detail construction will be understood from figs. 1, 2 and 3, which show elevations and section of the lamp and bracket, and figs. 4 and 5, which show a detail of the reflector.

The aim of the device is to supply an obvious deficiency in the present methods of car illumination, the concentration of light in a position where the rays will fall with the requisite intensity upon the work. It is a matter of common observation that, while a car may appear brilliantly illuminated upon entering, the light will prove far from adequate for reading without severely rying the eyes. Two features necessary for a perfect car lighting system are good general, and brilliant localized, illumination. This latter feature must, in addition, be free from danger of fire, disagreeable heating effects, or discomfort to neighboring passengers from the direct rays emitted on a level with the eyes. A strong recommendation of the electrical system of lighting is the facility with which all these conditions may be satisfied.

The Gibbs lamp consists of a small drum having two rotating shutters, shown at A and B, figs. 2 and 3, which can be raised or lowered when desired to show or shut off the light. The electric lamp is fastened to one end of the drum, as shown in fig. 1, and extends into it. Below the lamp is a double, beveled reflector, which throws the light outward and effects an illumination of the seats on both sides of the partition without loss of light. The detail of the reflector and its exact location are easily understood from the drawing. The hood formed by the upper half of the drum is so arranged that it shades the light from the eyes of the passengers who are facing it, and it also serves as a reflector to cast light upon the book or paper in the hands of the passengers sitting under it. The total number of lamps per car is not increased by the use of this berth lamp, because a corresponding number may be taken from the centre of the car.

Considerable attention has been devoted to the ornamentation of the shield and the sliding cover, with the result of giving this device a graceful appearance, harmonizing with the general ornamentation of the cars on the St. Paul road. This reading lamp has been introduced in all the sleeping cars—15 in number—running between Chicago and Omaha, and Chicago and St. Paul and Minneapolis on the vestibuled trains of the St. Paul.

Safety of Trainmen.

We have received from Mr. L. S. Coffin a communication written somewhat in reply to recent editorials which have appeared in this journal on the matter of legislation for the safety of trainmen. The communication is very long, and we have taken the liberty of condensing it, endeavoring, however, to retain all of the points presented, even if some of the force of his argument is lost.

While he is disappointed at the lack of recommendation by the Interstate Commerce Commission for decisive national legislation, he feels nevertheless that the great attention that is given the subject in their annual report will aid in the progress of the reform, which is already rapid. That it will be carried on to completion he thinks admits of no question. Mr. Coffin's deep interest in this matter dates from his service as Railroad Commissioner of the State of Iowa, when in his official capacity he was obliged to give it much attention. Now, although no longer officially responsible, he feels that his personal responsibility is greatly increased by the commission which he holds from the Brotherhood of Railroad Trainmen to act for them in all matters pertaining to power brakes and automatic couplers. He feels that he is speaking for the "under dog in the fight," and that he would not be justified in relaxing his efforts for a moment, considering the terrible frequency of accidents resulting in deaths and injuries which might be averted by the use of well-known appliances. However serious may be the reasons for caution in legislating, there is a tremendous pressure for haste. Three or four lives a day are sacrificed in the United States because of the want of automatic couplers and brakes, and he does not feel justified in admitting of a delay of a single month more than is absolutely necessary. Moreover, there are many railroads in the country which would make no effort to put on safety couplers or brakes unless forced to it by the law.

As to the objections to national legislation, Mr. Coffin considers that this is a matter of police regulation and

quite within the province of the state governments; but for the good of the roads, if for no other reason, it is desirable that there should be uniformity; hence the appeal for national legislation. No law specifying the kind of coupler or brake to be used is asked for; simply that they should be such as practical railroad men know to be safe and efficient. It is asked merely that the roads shall be compelled to use what they themselves have fixed upon as standards.

As to the economical consideration, Mr. Coffin is confident that stockholders would be actually benefited by being compelled to use these automatic appliances. Operating officers know that they can do as much work with 800 cars equipped with power brakes and close couplers as with 1,000 equipped with hand brakes and links and pins. The *Railroad Gazette* has said that the cost of this change would amount to as much as the total sum paid out in dividends by all the railroads of the United States in one year. Mr. Coffin assumes that the average dividends are five per cent., and suggests that one per cent. per annum for five years be set apart for this work. In the end it will be the best financial scheme that the railroads of the nation could undertake. This the managers and operating officers understand, but it is difficult to get owners to realize it. He thinks it safe to say that at least one-half of the collisions would be averted by the use of these appliances and consequent loss of property prevented. He thinks that after the first year's expenditure of an amount equal to one-fifth of the total sum paid in dividends, the economy from the appliances so put on would suffice for all remaining expenditure. Mr. Coffin believes that if he lives five years, and meantime this law becomes largely operative, the owners of the roads will be ready to vote him a more valuable medal than that which the Brotherhood of Railroad Trainmen has already given him.

Mr. Coffin then considers the money aspect of the question from the employees' side. The fiscal year of the Brotherhood of Railroad Brakemen closed last October. The average membership for that year was 10,000; now it is nearly 20,000. The Brotherhood paid out that year in benefits to sick and injured, and for total disabilities, over \$250,000. About four-fifths of this expenditure is estimated to have been caused by brake and coupler accidents, or such as would have been averted had automatic apparatus been in use. During that year the order embraced about one-tenth of the brakemen of the United States. It will be seen that, carrying out the proportion, had all of these men been included in the order, there would have been paid out benefits to the amount of \$2,500,000, of which \$2,000,000 would have been paid on account of hand brakes and link-and-pin couplers. "Here is the money side to this question with a vengeance." These estimates, Mr. Coffin says, are based on real facts. When it is remembered that \$1,000 is the maximum paid for total disability, the awful sacrifice of life and limb represented by these figures is appalling and makes one impatient with the financial argument against the improvements called for. While there is everything to gain and nothing to lose on the part of the stockholders, and everything to lose and nothing to gain on the part of the brakemen, Mr. Coffin cannot see the harm in asking the supreme law of the land to say to railroad companies, "Thou shalt not kill."

It is admitted that the main objection, and almost the only objection, brought against the proposed change is its cost. It is admitted that, sooner or later, it will be made, but it is said that if pushed too fast it will embarrass the roads. To this Mr. Coffin replies, "All that a man hath will he give for his life," and then draws an effective picture of the average stockholder on the top of one of his own trains, in Iowa, of a winter's night with the thermometer 30 degrees below zero, the deck a sheet of frozen sleet, the wind blowing a gale and the air thick with snow. In passing from one car to another the stockholder slips, and Mr. Coffin feels confident that at that instant he would give every dollar of his stock to be at home.

Locomotive Performances on the Elevated Roads.

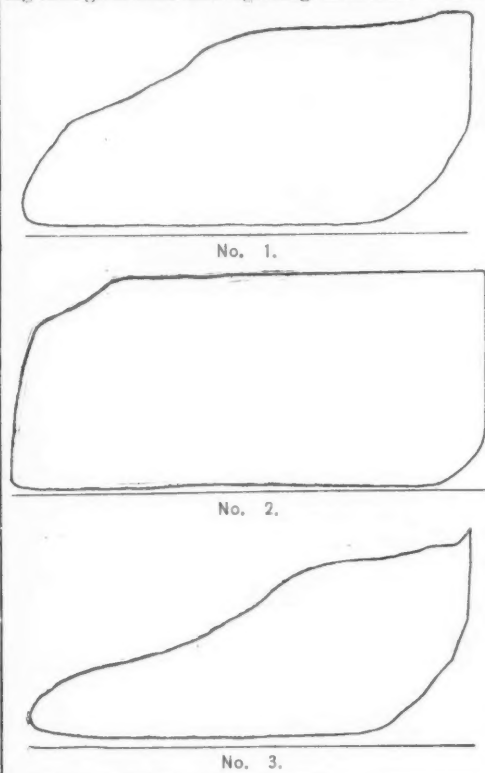
We have had several inquiries regarding the starting of trains and the action of the locomotives on the elevated roads in New York City. One of the most interesting problems connected with "rapid transit" roads is that of the time required to accelerate trains and that occupied between stations. The information on this point is quite meagre. No extended series of experiments has been recorded either for elevated trains or suburban service of other classes. Such experiments, if properly made, would add materially to our knowledge of the comparative values of the different classes of suburban engines.

The accompanying indicator cards show the action of steam in the cylinders of a Manhattan Elevated locomotive under the conditions given. These cards were taken

*Poor's Manual for 1889 gives the dividends paid in the fiscal year 1888 as 1.77 per cent. on the total stock of the roads; and the interest and dividends paid on stock, bonds and debt as 3.03 per cent.

Prof. Adams, statistician of the Interstate Commerce Commission, gives for the roads reporting in the year ending June 30, 1888 (about 137,000 miles), total payments on railroad capital, including miscellaneous debt, 3.06 per cent. The dividends on common stock were 2.03 per cent. and on preferred stock 2.39 per cent.—EDITOR.

as follows: No. 1, on leaving Ninety-eighth street, going south, with a five-car train well loaded. No. 2, taken while leaving Chatham Square, after having run 600 ft. Both of the above-named stations are located on a grade which increases the resistance to starting the trains. Card No. 3 was taken between Eighteenth and Fourteenth streets after having run 1,000 ft. The following table gives some data regarding the indicator cards:



Number of card.	Revolutions per minute.	Steam pressure lbs. per square in.	Throttle.	Reverse lever.	Cars in train.
1	70	112	1/4 open.	4th notch.	5
2	170	120	Full open.	6th "	5
3	174	120	"	7th "	4

The following are the general dimensions of the locomotive:

Boilers, 42 in. diameter.	16.5 sq. ft.
54 tubes, 1 1/2 in. diameter; 75 1/4 in. long.	403.4 sq. ft.
Length of furnace inside, 55 5/16 in.; width, 43 in.	42 in.
Area of grate	12 x 16 in.
Total heating surface	3 1/2 x 8 3/4 in.
Diameter of driving wheels	1 3/4 x 8 3/4 in.
Cylinders	3/4 in.
Steam ports	1 1/2 in.
Exhaust ports	1 1/2 in.
Width of bridge	1 1/2 in.
Inside lap, 1-32 in.; outside lap, 1/8 in.; lead, 1-16 in.	4 in. diameter (single).
Exhaust pipe nozzles	3 1/2 in. diameter.
Steam pipes	1 1/2 in.
Steam pressure	135 lbs.

The maximum speed on the elevated road is 25 miles per hour, and on a level line it requires from 1,000 to 1,200 feet to get up to speed. The average horse power to do the work required is 145. The average consumption of coal per mile is 45.7 lbs. The average number of miles run per ton of coal is 49.4 lbs. The engines work on an average of about 20 hours per day with two crews, each crew averaging 70 miles and making 208 stops during that time.

The Brake Question in India.

A late issue of *Iron* (London) contains an article on this subject, from which we make some extracts. Although no facts are given which are not now known to many of our readers, the expression of opinion is important.

The Indian authorities directed their attention to this question during the past year, and proposed to make, near Quetta, competitive trials with Westinghouse and vacuum brakes, with the view of determining which of the two systems would be more suitable to Indian requirements. It so happened that delegates from several railway companies had been summoned to a conference in reference to traffic arrangements, and, apparently as an afterthought, the question of continuous brakes was submitted to these delegates. The gentlemen upon whom this task devolved were not acquainted with the technical questions which it was so important to consider, and they, therefore, could not be expected to form a satisfactory tribunal. The trials which were made, and upon which they were to base their conclusions, were not merely incomplete and unsatisfactory, but were of such a character that it would be impossible for any gentlemen thoroughly acquainted with the subject to think of placing any reliance upon them. It will scarcely be believed that the longest train fitted with the vacuum system measured only 790 feet in length, and was much shorter than the trains frequently used in daily practice, whilst the Westinghouse brake was tested on a train 1,415 feet long, and which corresponded with the longest train used in daily practice in the Indian service. To any ordinary mind the question would have been practically settled when the Vacuum Company admitted its inability to work with the vacuum system as there represented a train of greater length than 790 feet; and these conditions were, therefore, quite unfair to the Westinghouse Company, as regards the most important point, viz.: the relative lengths of the trains. For this reason alone, the comparison of the two systems was unfair, and it is only neces-

sary to state these circumstances to show that no decision could fairly be arrived at, or ought to have been come to, on such a trial, although the experiments were perfectly successful so far as the Westinghouse brake was concerned.

A further point is that the results of the trials were not ascertained with a necessary accuracy. No instruments of precision were used to register automatically the particulars on which the actual results depended, which is absolutely required in tests of this nature. . . . No such test as that made in India would have satisfied the German or, we should have thought, any other authorities. The ease with which the trains were worked down long inclines by means of the Westinghouse quick-acting brake was fully demonstrated [at the Karlsruhe trials] and the absurd statements to the contrary which have been circulated were thus effectually and officially contradicted. The general results of these trials [at Karlsruhe] were so satisfactory that they terminated in the decision of the authorities of the Baden State Railways to fit the whole of their passenger rolling-stock with the quick-acting Westinghouse brake, and they have speedily been followed in this decision by the State railways of Bavaria and Wurtemberg, and by the Swiss railways.

Although the delegates stated most distinctly in their report that they were not prepared, merely on the strength of the experiments made, to recommend the exclusive adoption of either of the brake systems they tested, the agents and managers of the railways which the delegates represented decided to vote for the adoption of the vacuum brake, and consequently vacuum brakes, which could not admittedly be worked on long trains, were, as a commencement, at once ordered for a part of the stock of the Northwestern Railway of India. This action on the part of the Indian authorities was evidently premature, unsupported by facts, and much against the evidence, because it was originally stated by the authorities that the brakes should be capable of working on the longest trains, and, as already mentioned, the vacuum brake did not comply with this all-important requirement at the trials, whilst the quick-acting Westinghouse brake was successfully worked on a train 1,415 feet long. We are aware, however, that some of the highest authorities in India have not approved of the decision thus apparently arrived at to adopt vacuum brakes, and this is to their credit. . . . It is desirable to remember the amount of disaster which might be involved by making a false start. When once a certain number of brakes have been adopted on the various railways, it becomes more and more difficult to effect a change, and in such a country as India it is also evidently desirable that a uniform system, as well as the best system, should be adopted for the different lines. The experience in England is not altogether satisfactory in this respect. . . . On the greatest of English railways the chain brake, with which all the rolling stock was fitted, has been a lamentable failure, and is now abandoned, and the fittings have been replaced by another system, which also appears to have proved a failure.

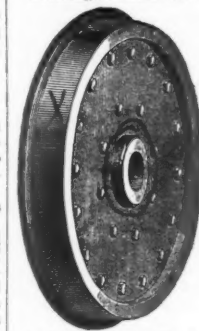
Report Card for Steel-Tired Wheels—Chicago & Northwestern Railway.

The form for reporting defective wheels shown here is one used by the Chicago & Northwestern for steel-tired wheels only. We have reduced the size considerably. The original is 7 in. x 8 1/2 in. The report is made by the Superintendent of Motive Power to the General Manager.

In filling out the blank for each individual wheel the information called for by the printed headings on the report is given, together with sketches of defects on the cut of the wheel on the left-hand side of the card, as shown in the illustration. In this manner, with but little trouble, the company is enabled to keep a complete and accurate record of each individual steel-tired wheel from the time it is put in service.

CHICAGO & NORTHWESTERN RAILWAY COMPANY.
Report of Defective or Worn-out Steel-Tired Wheels in the Motive Power Department.

Number of report, No. 17.
Breakage as indicated.



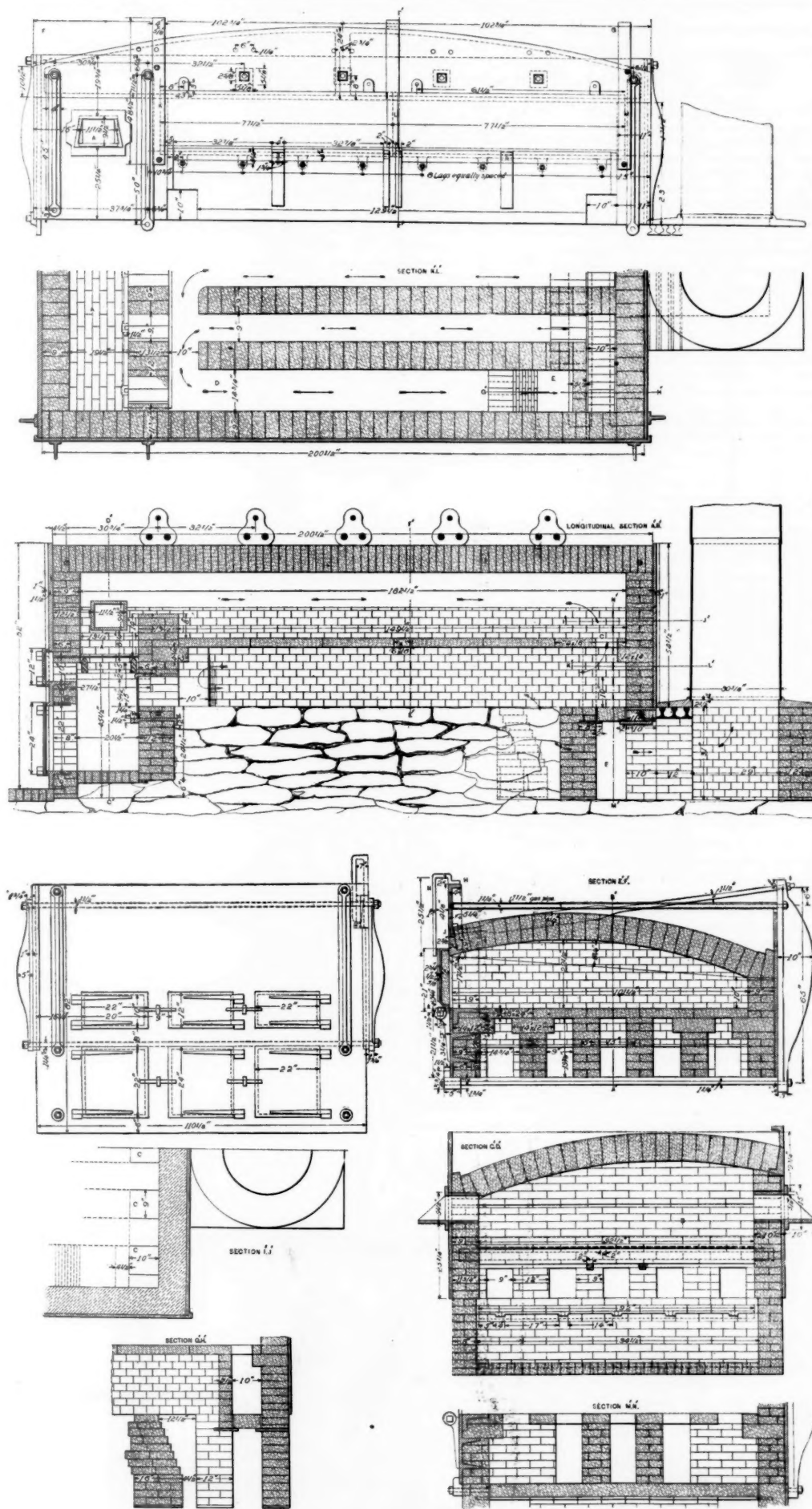
Number of wheel, 13,699; size, 30 in.
Manufactured by Allen Paper Wheel Co.
Date placed in service, March 15, 1886
Class of car under which it has been used, engine 624.
Number of times turned, three.
Date wheel was withdrawn from service, July 20, 1889.
Cause of withdrawal, porous spots in tire and loose hub.
Time in service, three years, four months, five days.
Thickness of tire when new, 2 1/4 in.
Thickness of tire when withdrawn from service, 1 3/4 in.
Total mileage, 115,487; mileage per 1-16 inch of tire wear, 8,249.

GENERAL REMARKS:

Signed,
G. W. Tilton, Superintendent M. P. & M.
To J. M. Whitman, Esq., General Manager.

Annealing Furnace—Rhode Island Locomotive Works.

The proper annealing, after flanging, of steel boiler sheets used in locomotive boilers is a somewhat difficult process, and as locomotive boiler specifications now often demand that all sheets be annealed after flanging, it has become necessary to provide furnaces which have capacity enough to receive such sheets. The furnace illustrated is one which the Rhode Island Locomotive Works has recently built to receive the largest sheets which they use in locomotive, stationary or marine boiler work. This furnace was designed in their works some years since, and has just been erected under the direction of Mr. J. Lythgoe, Agent and Superintendent. The furnace has been in operation for a few months and



ANNEALING FURNACE—RHODE ISLAND LOCOMOTIVE WORKS.

PROVIDENCE, R. I., 1889.

has shown no tendency to crack or get out of shape during repeated heating and cooling.

It will be noticed that the foundations are made of large building stone, the bottom of which is laid below the frost line. This is necessary because the furnace is made of large cast-iron plates, and it is very desirable that the foundation should be such as will withstand the action of frost without settling.

One of the most essential features of an annealing furnace is the even distribution of heat over the whole surface of the sheet. In this design the flames which are formed in the furnace at A are carried over a bridge

wall B, which runs the whole length of the furnace. From this the hot gases are guided to the opposite end, where they pass through openings to the conduits below the furnace, as shown by the arrows at C. The gases are then conducted back to the end of the furnace, where they pass around to other conduits along the outside, as shown at D, whence they return to the chimney.

The grates are made of flat bars of iron, as clearly indicated on the drawing. These bars are carried on cast-iron bearers.

The proper setting of such a large furnace has been the subject of much consideration, and it will be noticed

that the whole top of the furnace is carried on the side wall and on the other side by a cast-iron girder across the whole front of the furnace. This cast-iron girder is held laterally by the stay rods which pass through it and extend across the furnace to the back stays of the opposite side. The horizontal rods are surrounded by a pipe which keeps the cast-iron girder in an upright position. The inclined cross ties are flattened where they pass between the bricks in the crown of the furnace and extend through the cast-iron girder at J, where a nut is placed to hold them in position. The large doors in front of the annealing furnace are made in two sections, and are guided vertically by wrought-iron straps, as shown at K L M N. When the door is dropped in position it is held tight against the furnace by the rollers over which the sheets are drawn.

It will be noticed that all of the tie rods in this furnace are carried below the gas conduits, because it has been found that in furnaces of this sort previously built the oxidation caused by the gases was very rapid, and the rods were soon cut across, even where the gases were not sufficiently hot to heat the rods injuriously. This furnace has been most carefully constructed, and each wall, it will be noticed, is carried on a wall plate, and special provisions are made to reduce the labor required in repairs. The drawings are complete, and the different details of construction are clearly shown thereon. The design is not a cheap one, but it is very probable that economy of operation and maintenance will more than offset the high first cost.

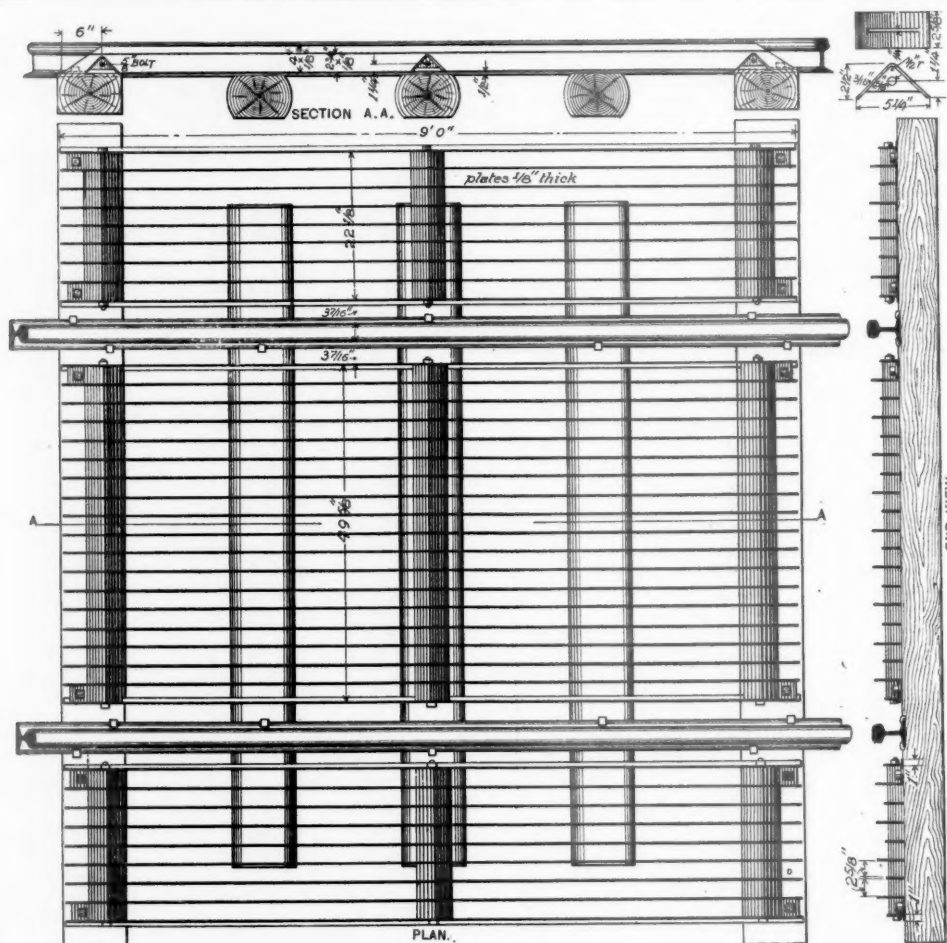
Tests of Stationary Engines.

Some of the stationary engine builders appreciate the necessity for careful tests of these engines before they are delivered to their purchasers; but while this is often done in the case of the more important sales, yet probably only the Westinghouse Machine Co. has extended the test to all sales, and further, to all engines built. In order to equalize and make uniform the water per horse power of their different engines of the same design, they have found it necessary to test every engine by itself, and to make those minor changes which alone will cause all engines built from the same templates and according to the same gauges and drawings to work with equal economy. Greater attention should be paid to testing small engines before they are shipped, in the same thorough manner that larger engines are tested after they are placed on their foundations, in order to meet the growing demand for more uniform production, and to this end there has been erected at the works of the Westinghouse Machine Co. a test room containing foundations on which 10 engines can be tested at once.

These foundations are provided with planer-bed tops, so that any size of engine can be readily bolted to them. Three large boilers fired by natural gas furnish steam at any pressure, and superheating devices are added for experiments in that direction. The full load is given to the engine by a Prony friction brake lubricated with suet and cooled by the circulation of water in the hollow rim of the wheel. This company has from the first tested all engines individually under a full load, simply for power and running qualities, from the 5 H. P. junior engine to the 250 H. P. standard engine. A large surface condenser and air pump is provided of sufficient capacity to maintain vacuum for 500 H. P. Below the condenser are two galvanized iron tanks standing on iron scales in such a position as to receive the discharge from the condenser in either tank at will. It is evident that with this arrangement all the steam which enters the engine will be accounted for in the condenser in the form of water, except such as may pass from the overflow in the crank case, which is separately measured. The accuracy of the test is therefore beyond question, while at the same time it is practical in its nature, and presents no refinements beyond what may be reproduced in ordinary commercial usage.

Each engine when completed is bolted to a foundation and connected with the boilers and the condenser. A force of three skilled men is constantly employed in the tests. No. 1 manipulates the brake, maintaining a full and steady load and noting the brake readings which give the net horse power. No. 2 takes frequent indicator diagrams showing the gross or indicated horse power. No. 3 fills, weighs and empties the tank, keeping the log of the run.

The difference between the indicated and brake horse powers is that lost in friction of the engine. In new engines which are stiff and close in their fits the friction ranges from six to eight per cent. of the full load. After a few days' run the friction falls to three and a half or five per cent. It having been demonstrated that the water rate is independent of the length of the run, the tests are for convenience usually of 10 minutes' duration, and are repeated several times on each engine. The weight of water collected in the condenser divided by the horse power and corrected for the duration of the test is therefore the duty of the engine in pounds of water per horse power per hour. The first tests are always made with the condenser open to the atmosphere, no vacuum being maintained and the condenser serving only to collect the steam exhausted. If a vacuum test is desired the condenser is closed and the air pump started. Every engine turned out is obliged to show a water rate non-condensing as low as 24 lbs. per horse power before it is passed. Experience has shown that its duty is im-



THE IRON SURFACE CATTLE GUARD.

Made by the NATIONAL SURFACE GUARD CO., Chicago, Ill.

proved at least one pound after the packing rings, etc. have worn tight by two or three months of use.

The log and results of the test are entered in a record book. The original indicator diagrams taken during the test are pasted on the opposite page and the signatures of the men conducting the test are subscribed to each record. The manufacturer, therefore, becomes positively insured as to the duty which the engine he is about to purchase will give, and takes no chances whatever. It occasionally happens that out of a lot of twenty engines all but one will come down at once to the standard duty, while one will refuse to come below 26 or 28 lbs. This engine is made on exactly the same templates and with the same care as the other 19, and were it not for the test room it would certainly be shipped as a perfect engine, in which case, if undiscovered, it would cheat the customer every time that it ran. It is by such careful attention to the details of manufacture as this that the various Westinghouse companies have been enabled to keep their devices uniform in character and operation. No better illustration need be cited than the exact duplication and uniform operation of automatic air brake appliances which are necessarily sensitive and delicate and therefore difficult to make uniform.

The Iron Surface Cattle Guard.

The illustration of this appliance shows its construction in such detail as to leave very little description necessary. The guard is made, as shown, to cover 9 ft. lengthwise of the track and to fill up the entire space between the rails, and to extend either side of it to such a distance as is found necessary, say, ordinarily, a little over 2 ft. It is made of iron strips, extending its whole length, set on edge, $2\frac{3}{4}$ in. apart. The iron is $\frac{1}{8}$ in. thick. These strips stand alternately $2\frac{3}{4}$ and 4 in. high, as shown in the cross section. They are held in position by $\frac{3}{8}$ -in. bolts and by malleable iron spacing pieces or thimbles. The detail of one of these thimbles is shown in the upper right-hand corner of the illustration. The bolts extend through the entire structure between the rails, and similar bolts go the entire width of each of the parts placed outside of the rails. The guard being made in three pieces, in this way, is easily taken up for repairs to track, while it is in itself so flexible as to receive no injury from irregular depression of the ties under passing loads. It is claimed, also, that this flexibility is advantageous in that it gives the cattle stepping on the guard a feeling of insecurity, causing them to at once retreat. The strips are carried $\frac{1}{2}$ in. above the ties. The ends of the strips are chamfered, as shown in the cross section, to prevent catching in hanging chains, etc.

This form of cattle guard was recommended by the Roadmasters' Committee on Cattle Guards and Crossings at the Denver Convention, and the report of that

committee was unanimously adopted. The committee considered it the best and safest one in use, for the reason that it obviates any opening in the track, will turn cattle as effectually as the open guard, costs less than a pit guard, is easily removed for purposes of repairs, and obviates trouble from heaving by frost. This guard was also adopted by the New England Roadmasters' Association at its last convention. It is now in use on many different roads.

Hollow Chisel Mortising Machine.

Perhaps none of the American machinery exhibited at Paris last summer attracted more attention than the hollow chisel mortising machines. These ingenious and extremely useful labor-saving tools, which have found great development and use in the United States, appear to be little known to Europeans. The one which

is illustrated in this issue is an extra heavy machine, of recent design, made by the Berry & Orton Co., of Philadelphia. It is intended to be particularly applicable for use on hardwoods in car building. The makers have aimed to make it the most complete machine of the kind ever offered, and claim for it the following points of superiority:

A strong, substantial machine, little liable to get out of order; longer and accessible belts, which are all outside the framing of the machine; the driving power for forcing the chisel into the wood is placed as near the centre of the chisel as possible; the support of the timber to be acted upon is directly back of the table and is in a direct line with the chisel; the framing of the machine is such that the thrust while making the mortise is taken both above and below the chisel, hence the spring of the machine is reduced to the minimum, and the chisel, after being forced into the wood, is withdrawn with much more ease and less liability to break than when the strain is taken entirely below the chisel; a double set of stops for regulating the position of mortises vertically. The details furnished are: One each, $\frac{3}{4}$ -in., $\frac{5}{8}$ -in., 1-in., $1\frac{1}{4}$ -in. and $1\frac{1}{2}$ -in. chisels and augers, a countershaft, and a full set of steel wrenches. The weight of the machine is 5,600 lbs. The countershaft has tight and loose pulleys, which are 12-in. diameter, 6-in. face, and should make 800 revolutions per minute.

Tests of Iron Axles.

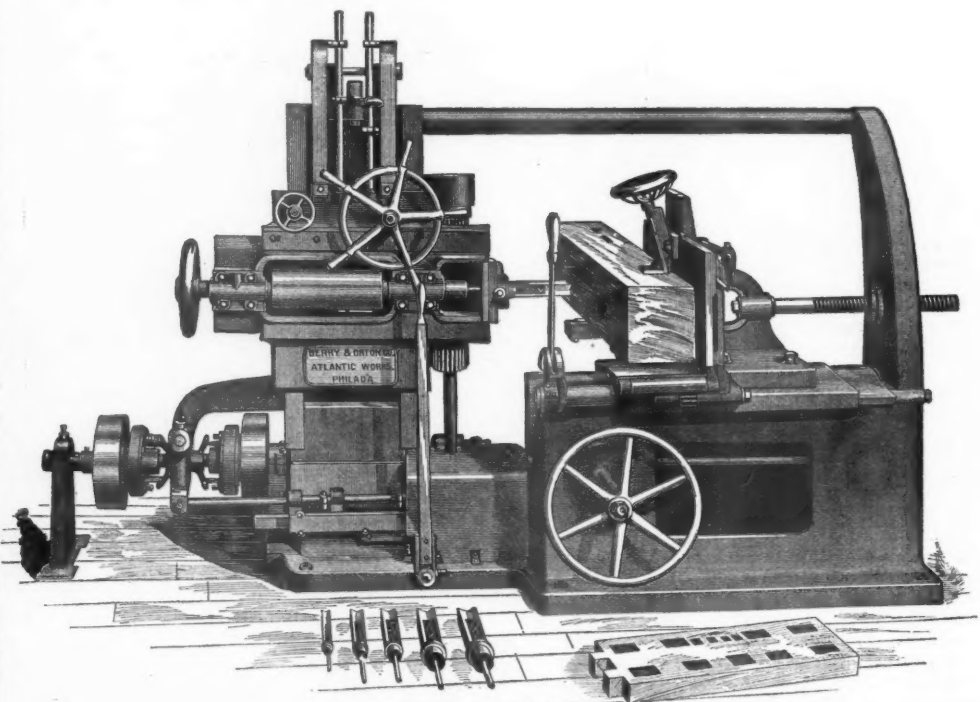
A test of iron axles showing excellent material was recently made by the United States Rolling Stock Co. at the Anniston shops. The following are the results of the tests of one of a lot of 500 axles made for the Savannah, Florida & Western. The drop was raised 10 feet for the first three blows and 15 feet for all following blows.

Blow.	Deflection. Inches.	Blow.	Deflection. Inches.	Blow.	Deflection. Inches.
1	$1\frac{1}{8}$	10	$1\frac{3}{4}$	19	$1\frac{3}{4}$
2	$1\frac{1}{8}$	11	$1\frac{3}{4}$	20	$1\frac{3}{4}$
3	$1\frac{1}{8}$	12	$1\frac{3}{4}$	21	$1\frac{3}{4}$
4	$1\frac{1}{8}$	13	$1\frac{3}{4}$	22	$1\frac{3}{4}$
5	$1\frac{1}{8}$	14	$1\frac{3}{4}$	23	$1\frac{3}{4}$
6	$1\frac{1}{8}$	15	$1\frac{3}{4}$	24	$1\frac{3}{4}$
7	$1\frac{1}{8}$	16	$1\frac{3}{4}$	25	broke.
8	$1\frac{1}{8}$	17	$1\frac{3}{4}$		
9	$1\frac{1}{8}$	18	$1\frac{3}{4}$		

During the month of December last this company made 2,215 axles.

Rolled Forgings.

Numerous machines have been invented for producing small forgings by a rolling process, but the many difficulties encountered have prevented the most of them from attaining commercial success. In the forging machine here illustrated, invented by Mr. Charles E. Gould, and built by the Gould Rolling Machine Co., Leominster, Mass., it is claimed that these difficulties have been overcome. The machine is designed for forging such articles as balls, handles, spindles, etc., in fact anything whose section at right angles to the axis is circular, from rods of steel or iron. Some of the forgings are shown in the accompanying figures, fig. 1 being a steel handle, fig. 2 a steel ball, fig. 3 a shuttle tip, fig. 4 a conical shell, and fig. 5 a shoe calk. Fig. 6 is a perspective view of the machine, showing a rod inserted between two toothed segments which grasp it and cause



HOLLOW CHISEL MORTISING MACHINE.

Made by BERRY & ORTON COMPANY, Philadelphia, Pa.

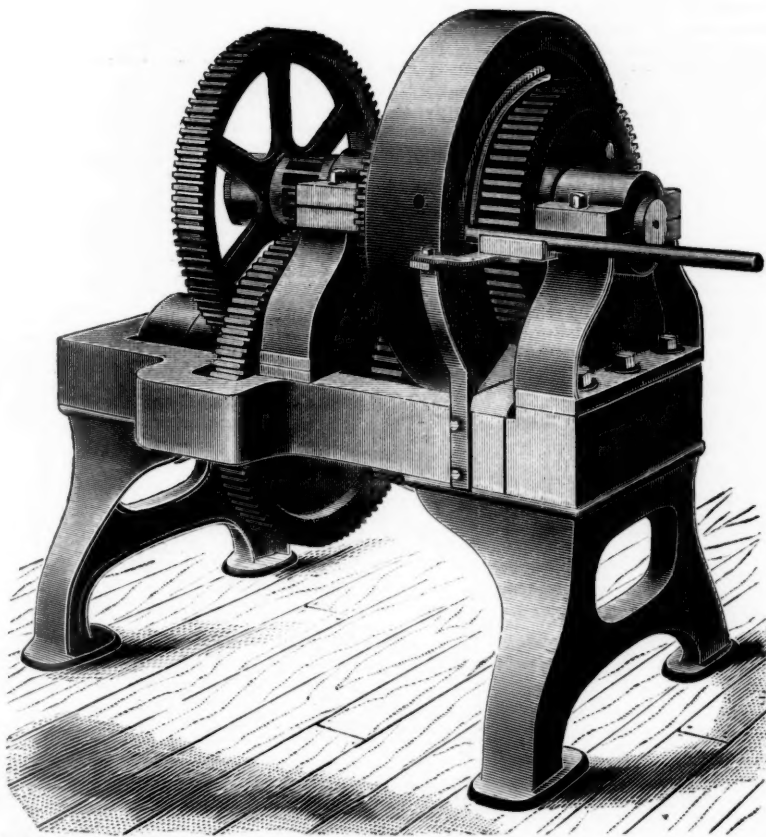
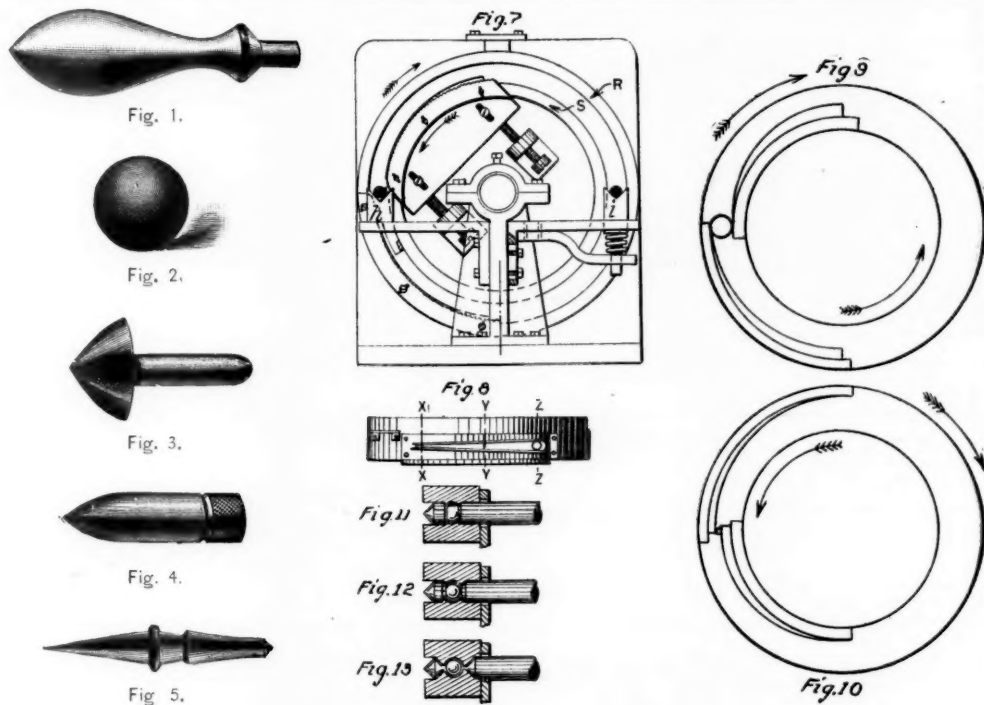


Fig. 6.

ROLLED FORGINGS BY THE GOULD MACHINE.

it to revolve as its end passes through the dies. The toothed segments seen in fig. 6 are secured to two wheels, *R S*, fig. 7, which revolve in different directions, one within the other. The outer circumference of the wheel *S*, and the inner circumference of the wheel *R*, each carries one-half of the die used in forging the article, in this case a ball or sphere. These dies are formed with diverging openings, deepening from the narrowest to the widest point, as illustrated in fig. 8 which shows the die secured to the wheel *S*, and are provided with cutting edges for separating the forged article from the rod. The wheels *R* and *S* are geared together in such a manner that the dies meet at their narrowest points and separate at their widest points, as shown in figs. 9 and 10, which represent, respectively, the meeting and separation of the upper and lower dies. The various steps of the forgings are sketched in figs. 11, 12, 13, which represent cross sections taken at *x x*, *y y* and *z z* of fig. 8.

Since the dies on the wheels *R S* meet twice in each revolution, two rods are inserted, from which forgings can be made, one on each side of the machine; being held in supports or guides *h i*, fig. 7. The inner wheel *S* being of less diameter than the wheel *R*, the circumferential speeds of the two wheels vary slightly, so that the rod, being held by the toothed segments, will have slight motion of translation as well as a motion of

revolution. The effect of this upon the rod at the left of the machine, resting in the support *h*, will be to lift it slightly from its place, to which it will drop again after the passage of the dies. The rod resting on the support *i* is depressed by the passage of the dies, and provision is made for this by placing the guide upon a spring support, as shown, which forces it back into place after the rod is released by the dies. It will be noticed that the lower die is secured to an adjustable piece *l*, fitted in the wheel *S*. The rod from which the forgings are to be rolled is heated before insertion into the machine and there is a stop against which the end strikes to secure the proper adjustment.

Disappearing Curtain Rails.

For various reasons, but principally probably to save the cost of cleaning rails in sleeping cars, the Pullman Company has for some time past been looking for some method of removing the rail when not in use. The result is shown in an invention of Mr. Sessions, Manager of the Pullman Works, illustrated herewith.

The curtain rails in this construction are of wood covered with plush, and extend only the length of each berth. Fig. 1 shows the ends of two rails ready for the curtains. In fig. 2 the curtain rail and bracket are shown in full lines in position for the curtains, and in dotted

lines when folded away in the berth. During the day when the curtains are not required, the curtain rail is revolved into the berth on a pivot, as shown at *A*. The rail in this position does not interfere with the blankets and mattresses in the berths when closed. When the berths are let down the curtain rail is swung to the position shown at *B* and securely locked by a key wrench in-

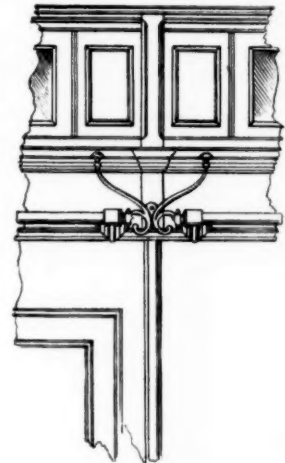


Fig. 1.

serted in a keyhole at the middle of the berth. Recesses are made in the moldings above the berth which permit the brackets for the curtain rails to pass through and remain in position as well when the berth is closed as when it is open. Cars fitted with this curtain rail

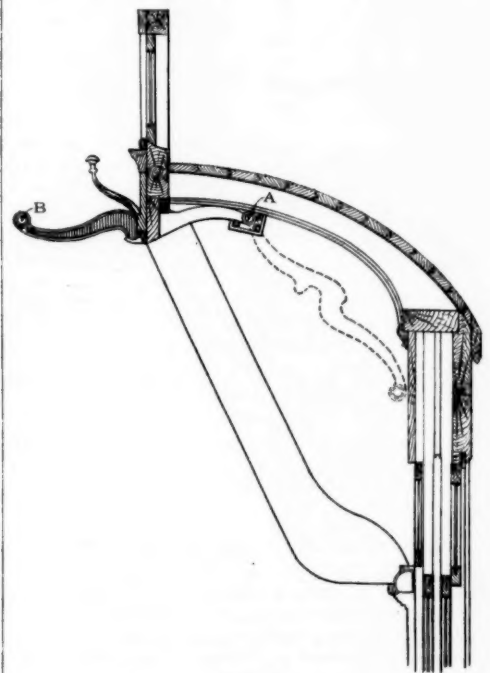


Fig. 2.

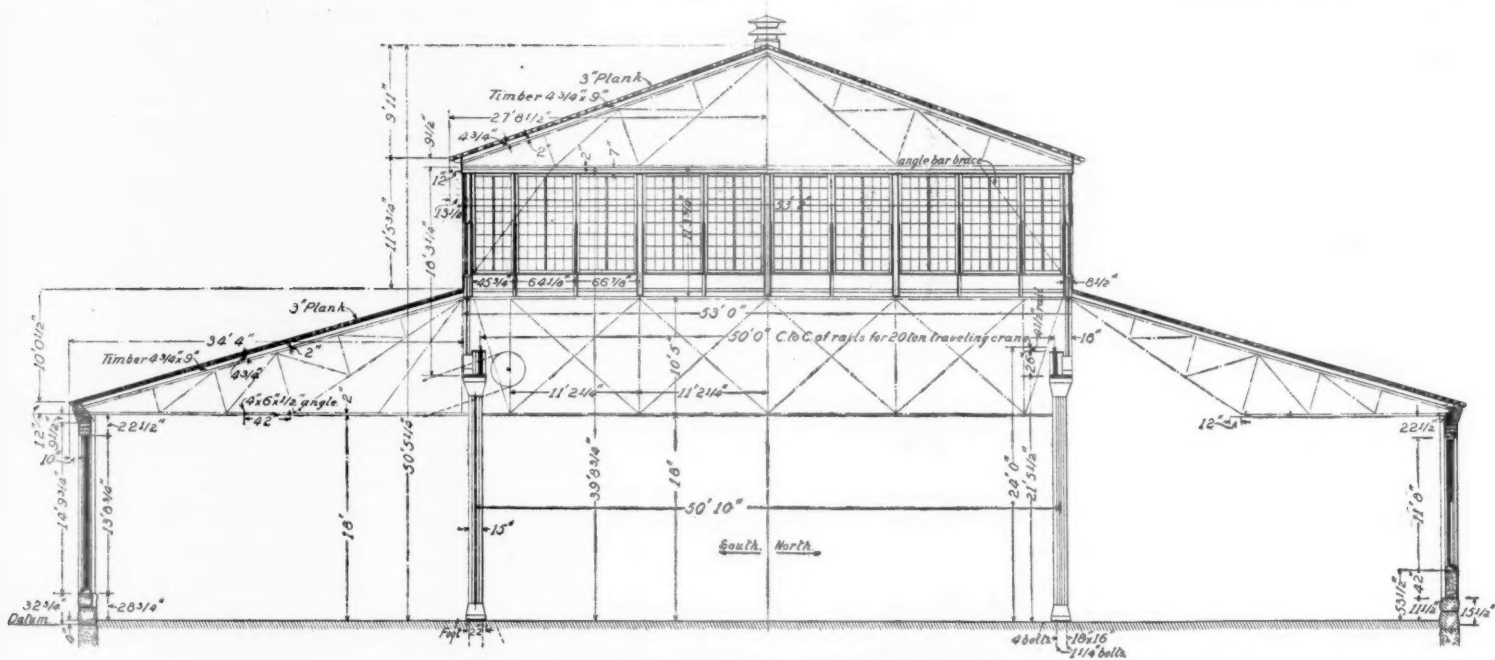
have a more roomy appearance when the rails are revolved into the berth. The Pullman Company expects to fit up all its cars with this device, and the saving in the matter of polishing alone will more than pay for the change from the rails now in use.

The Decauville Railroad at the Paris Exhibition.

This railroad, starting from the Esplanade des Invalides, passed through the exhibition grounds, terminating at Machinery Hall. The total length was 1.86 miles, with five stations. The maximum grades were 147 ft. per mile, the minimum curves 98.4 ft. radius in the main line, and 65.6 ft. radius at stations and crossings. One curve and reverse curve of 98.4 ft. radius occurred on a maximum gradient. The gauge was 23.6 ins. The rails were 19½ lbs. per yard, riveted to a section steel sleepers with closed ends. Not a single rivet was found to be displaced after carrying 1,200,000 tons, and the state of the switches and crossings was equally good.

The engines were Mallet's compound articulated pattern, with two four-wheel trucks, weighing 41½ tons in working order. They ran for six months 16 hours a day at an average speed of 14.3 miles per hour. The engine crews worked 8½ hours. As first constructed the engines were found not to work equally as regards effect due to each pair of cylinders, 36 horse power being obtained from the high-pressure, and 20 from the low-pressure cylinders, under given conditions. This was remedied by altering the lap of the valves.

Dynamometer experiments showed a tractive resistance of 5½ lbs. per ton to train load at 15½ miles per



BOILER SHOP—PITTSBURGH LOCOMOTIVE WORKS.

hour on the most favorable parts of the line; 7.7 lbs. on a curve of 138 ft. radius, and 16.5 lbs. at 6.2 miles per hour on a reverse curve of 65.6 ft. radius.

The line was divided into sections by seven block signals, which trains were not allowed to pass at less intervals than 90 seconds. Trains were worked by time table, which was arranged for 252 train on week days and 204 trains on Sundays and other days of heavy traffic. At the terminal stations barriers were erected, within which passengers waiting to the number of a full train load, or 400 persons, were impounded and allowed to enter the trains as soon as they were emptied. The operation of loading and unloading was effected in three minutes. The minimum interval between arrival and departure at the terminals was four minutes.

The results of operation are given as follows:

Number of trains run.....	42,500
1 train miles.....	66,406
Engine miles.....	71,175
Number of engines working.....	6
Gas coke burnt per train mile.....	13.2 lb.
Number of passengers carried.....	6,342,000
Gross tonnage hauled.....	1,787,018
Net tonnage (exclusive of engines).....	421,000
Gross tonnage hauled one mile.....	21,578,406
Gross receipts per mile in six months (173 days).....	\$35,200
Working expenses.....	\$10,240
Working cost per train mile.....	4s. 9 3/4d.

The days of largest receipts were:

	£	Total visitors to Exhibition.
Sunday, Sept. 8.....	637	308,905
Wednesday, Nov. 6 (closing day).....	712	370,354
Sunday, Oct. 13 (maximum of visitors).....	614	387,877

For these facts we are indebted to *The Engineer* (London).

Boiler Shop, Pittsburgh Locomotive Works.

The Pittsburgh Locomotive Works, although one of the best fitted shops for its size in this country, has recently felt the need of larger and better buildings to facilitate the production of superior locomotives at what continue to be low prices. Within a few years they have built a model foundry, which is well equipped and has considerably reduced the cost of making locomotive and machine castings. At the present time they are reconstructing all their other shops and offices. In the accompanying illustration is shown a cross section of the new boiler shop.

This shop is well lighted and ventilated. It is of brick, with stone foundations as high up as the window sills. It will be noticed that the pillars which carry the traveling crane also support the roof. The roof is covered with 3-in. plank, tongued and grooved, which is covered with tin. The length of the building over all is 275 ft. 2 1/2 in.; width, 120 ft.; spread of rails for traveling crane, 49 ft. and 6 in. centres; distance between posts carrying rails for overhead cranes, 11 ft. 2 1/4 in.

Rail Joint and Chair—London, Brighton & South Coast.

The illustrations of this joint and chair are from blue prints sent us shortly before his death by the late Mr. Stroudley, Superintendent of the locomotive and carriage departments of the London, Brighton & South Coast Railway. They were designed by Mr. Stroudley and Mr. Banister, and we give his own description of them.

This drawing shows the form of rail that our company has adopted, and also the design of the fish-plate joint. This makes a very excellent joint. The bolts in below the rails cause the fish-plates to spring in and make a metallic fit on the lower member of the rail, and this quite independently of the wedging action of the upper portion of the fish-plate. The strength of this rail joint is practically exactly the same as that of the solid rail.

The chair is made with as small an amount of iron as

is consistent with a large bearing surface on the timber and proper covering for the wood key. The chairs are held down to the rail by means of wood trenails, which have a drilled hole down the centre, into which an iron spike, having a large head, is driven, thus getting the strength of the iron spike with the elastic medium of the wood trenail. The chair weighs 45 lbs., and has a base area of 107 sq. in. The joint weighs 63 1/2 lbs. with bolts.

Corrections in Baker's "Masonry Construction."

Prof. I. O. Baker sends us the following corrections to be made in his Treatise on Masonry Construction, which was published by John Wiley & Sons last year.

In addition to the corrections noted below, a few typographical blemishes have been removed. If any one has discovered other errors, the author will be pleased to have notification of the same.

ERRORS IN FIRST EDITION CORRECTED IN SECOND.

- ✓ Page 239, 11th line, read "the length of pile 25 ft."
- ✓ Page 239, 12th line, for lbs. read tons.
- ✓ Page 239, 13th line, for lbs. read tons.
- ✓ Page 246, foot-note, for 373 read 273.
- ✓ Page 281, 4th line for 135 1/2 below high water read 100 feet 8 in.
- ✓ Page 300, 20th line, for 132 read 110.
- ✓ Page 300, 20th line, for 132 read 110.
- ✓ Page 383, foot-note, for \$36 read \$384.
- ✓ Page 408, 5th line below table, for middle read division wall.
- ✓ Page 455, 5th line of \$879, for the abutment read any joint.

- ✓ Page 462, 8th line below equation (10), for (8) read (9).
- ✓ Page 474, foot-note, for 445 read 455.

ERRORS IN FIRST AND SECOND EDITIONS CORRECTED IN THIRD.

- ✓ Page 486, in five places, for fig. 131 read fig. 135.
- ✓ Page 465, for the first two sentences under eq. (11) substitute the following: "The above relation, due originally to Navier, has, in itself, nothing to do with the position of the line of resistance, but is employed by writers who assume that an arch is stable if a line of resistance can be drawn anywhere within the middle third of the arch ring, to determine the crown thrust. Notice, however, that under these conditions the radius of curvature is known only within limits."

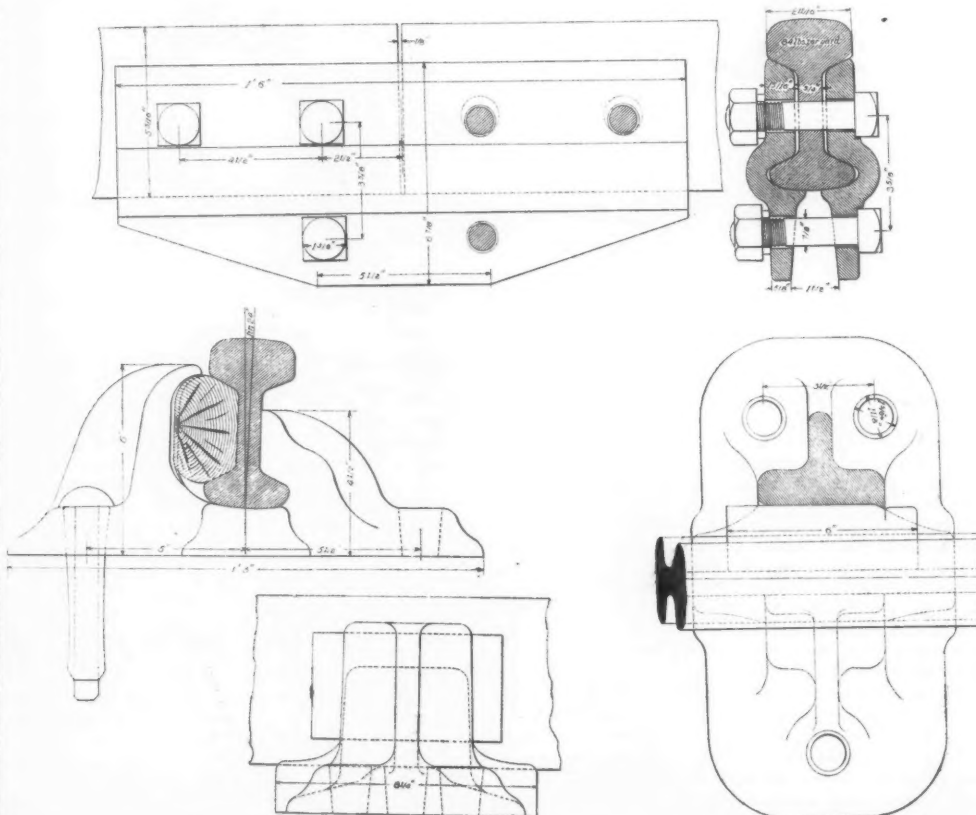
- ✓ Page 490, §708, for paragraph 1 substitute the two following: "This theory is approximate since it makes no attempts to determine the true line of resistance, but finds only a line of resistance which lies within the middle third of the arch ring."

- ✓ "The radius of curvature to be used in finding the crown thrust is indeterminate. It is frequently, but erroneously, taken as the radius of the intrados at the crown."
- ✓ Page 491, at the end of §708, the following objection to Rankin's theory has been added: "Rankin himself says ('Civil Engineering,' p. 422) that the method of §707 is inapplicable to circular arches greater than 90°, and gives a complicated formula for that case."

TECHNICAL.

Locomotive Building.

The New York, Pennsylvania & Ohio has placed an order for one passenger and five freight locomotives. The Louisville, St. Louis & Texas has received two



STANDARD JOINT AND CHAIR—LONDON, BRIGHTON & SOUTH COAST.

Designed by Messrs. BANISTER & STROUDLEY.

freight consolidation engines ordered of the Pittsburgh Locomotive Works last fall.

The Baldwin Locomotive Works this week delivered three light-weight locomotives to the Birmingham, Powderly & Bessemer.

The Staten Island Rapid Transit is asking bids on five locomotives.

The Central of Georgia has just received 13 locomotives, and will receive 20 more in the early part of next month. Of the latter 16 will be for freight and two for passenger service. The other two are shifting engines.

Car Notes.

The New York, New Haven & Hartford is building six combination cars at its New Haven shops.

The New York, Ontario & Western has let a contract for building 1,000 freight cars to the Indianapolis Car & Manufacturing Co.

The Staten Island Rapid Transit will soon give out orders for 20 passenger cars.

The Boston & Albany and the Boston & Maine are in the market for new freight equipment.

The East Louisiana road will shortly build six first-class passenger cars, probably at its own works. The company is now building a number of box cars at its shops.

The Barney & Smith Mfg. Co. have the contract for building 25 passenger and 10 baggage cars for the Northern Pacific.

The Chicago, St. Paul, Minneapolis & Omaha has ordered 25 refrigerator cars from the Peninsular Car Co., of Detroit. All will be equipped with air brakes.

The Duluth & Winnipeg will soon award the contracts for building both its passenger and freight equipment.

The Litchfield Car & Machine Co., of Litchfield, Ill., has about completed the delivery of an order for 200 refrigerator cars for the Cleveland, Cincinnati, Chicago & St. Louis.

The Central of Georgia has ordered 50 cabooses, and will soon receive the 23 baggage, mail and passenger cars recently ordered. The company is also now receiving 2,000 freight cars. These are in addition to an order of 1,000, the last of which were received in December, making 3,000 new freight cars ordered inside of a year.

The Savannah, Americus & Montgomery has under construction 400 platform, 200 fruit, four passenger and two baggage cars and five locomotives.

The New York & Northern intends to soon let the contracts for building a large number of new cars.

The annual meeting of the South Baltimore Car Works was held last week, and the following directors were chosen: John W. Hall, Clinton P. Paine, Wm. S. Rayner, James Sloan, Jr., J. Swan Frick, Edward L. Bartlett and Ferdinand C. Latrobe. The number of cars built during the past year was 1,621. At the beginning of the new year 700 cars were under contract. The directors re-elected John B. McDonald, President; Charles T. Crane, Secretary and Treasurer, and Howard Carlton, Manager.

Bridge Notes.

The Clinton & Illinois Bridge Co. has let a contract to the Clinton Bridge & Iron Co. to build a high wagon bridge from the north part of Clinton, Ia., to Stony Point, over the Mississippi, to cost \$186,700.

The Riverton Bridge Co. has been organized to build bridges over both branches of the Shenandoah River at Riverton, Va.

The County Clerk of Mariposa County, Cal., invites bids for building two bridges, one with a 130 ft. span, and the other with a 160 ft. span.

The Court of Claims of Barren County, Ky., has decided to build bridges across Skeggs, Fallen Timber, and Beaver creeks.

The City Engineer of Louisville, Ky., has prepared plans for an elevated roadway and bridge across the tracks of the Louisville & Nashville on Broadway. The estimated cost is \$50,000.

Two bridges across Tygart Creek, at Owen's Mills, and across Slate Creek, in Wood County, W. Va., have been erected by the County Commissioners, to replace those destroyed last July. The iron bridge over Pond Creek at Boso is nearly finished.

The County Commissioners, of Glynn County, Ga., have recommended the construction of a bridge at Evelyn, and another across Green Creek.

The contract for building the steel drawbridge across the Mississippi at La Crosse, Wis., has been let to the Clinton Bridge Co. for \$80,000.

The New York, Providence & Boston has nearly completed a highway bridge on Waterman avenue, East Providence, R. I., which carries the road over its two tracks below, by a 30 ft. span. The bridge has a corrugated floor.

The Missouri Valley Bridge Co., of Leavenworth, Kan., has a large force at work on the Broadway viaduct at East St. Louis, Ill., for which it has the contract.

The Chief of Army Engineers has made a report adverse to the passage of the Senate bill to authorize the substitution of a pivot drawbridge across the Missouri River at Leavenworth, Kan., in place of the present pontoon bridge.

On Feb. 11 an election will be held on a proposition to vote \$10,000 bonds by Louisville Precinct, Cass County, Neb., to build a county bridge across the Platt River.

It is proposed to hold a special meeting in Wheeling, W. Va., April 15, to decide the question of expending the sum of \$75,000 on the construction of a stone and iron bridge over the creek on Main street.

The Harrisburg Terminal Railroad Co. has been granted the right to bridge the Susquehanna at Harrisburg, Pa.

The Roanoke Land & Improvement Co. proposes to construct two iron bridges at Roanoke, Va.

The following bid were received for building an iron bridge at Warren, R. I., with a 136-ft. wrought-iron draw span: Berlin Bridge Co., \$6,950; Dean & Westbrook, \$10,225 and \$7,550; Pittsburgh Bridge Co., \$6,700; Pennsylvania Bridge Co., \$7,450; Wrought Iron Bridge Co., \$7,950; Smith Bridge Co., \$9,650 and \$7,850; New Jersey Iron Co., \$6,721; Boston Bridge Co., both structure and superstructure, \$22,408. The award has not been made, as a modification of the present plans is under consideration.

The Thousand Island Bridge & Railway Co. has asked the Dominion Parliament for incorporation for the pur-

pose of erecting a bridge over the St. Lawrence River at Brockville, Ont., and to build a short line of railroad.

The Lake Shore & Michigan Southern and the Cleveland & Pittsburgh have completed plans for a new railroad bridge over the Cuyahoga River.

The iron work for the bridge over Jones Falls, at Cedar Avenue, Baltimore, Md., will soon be commenced. The bridge is being built by the King Iron Bridge Mfg. Co. of Cleveland, at a cost of \$30,000. It will consist of two girder spans 80 ft. long over a highway and the Northern Central tracks; two girder spans 24 ft., and an arch span of 150 ft. over the falls. The elevation of the bridge above water level will be 50 ft.

The State Engineer of Colorado has awarded the contract for the bridge across the Grand River, in Eagle County, to the Missouri Valley Bridge Co. for \$5,190. The bridge will consist of two spans of 100 ft. each.

The following bids were received for the construction of the 200 ft. iron draw span at Grand Isle, Ont.: Pittsburgh Bridge Co., \$5,125 and \$5,500; Vermont Construction Co., \$4,900; Berlin Bridge Co., \$5,300; King Bridge Co., \$5,138; Variety Iron Works, \$5,200; Phoenix Bridge Co., \$7,850; Groton Bridge Co., \$5,180. The contract was awarded to the Vermont Construction Co., of St. Albans, Vt.

The County Auditor of Columbus, O., will receive proposals until Feb. 26 for the superstructure of the Rich street bridge over the Scioto River, which will have two spans 212 ft. and 256 ft. long, respectively, with roadway and sidewalks.

The McKeesport & Duquesne Bridge Co. is to build a foot bridge from McKeesport to Riverton, Pa., at an estimated cost of \$175,000. Mr. G. Lindenthal has charge of the work.

The Vaudreuil & Prescott has applied to the Dominion Government for authority to build a bridge across the Riviere a la Graise at the village of Rigaud, Quebec.

Manufacturing and Business.

Among other recent extensive orders of the Bucyrus Steam Shovel & Dredge Co., of Bucyrus, O., is one for three large steam shovels from the Lake Shore & Michigan Southern, making seven shovels furnished to this road. Two of these shovels are probably the heaviest ever built. They carry a three-yard dipper, and have a capacity of over 3,000 yards in 10 hours.

The Thomson-Houston Electric Co. reports sales of 198 arc lights for four isolated plants, and of 1,900 incandescent lights for 10 isolated plants. Sales of 22,350 incandescent lamps have been made to 30 central stations in 17 states, and sales of 1,400 arc apparatus have been made to 23 stations in 17 states.

Bement, Miles & Co., of Philadelphia, have been awarded the contract for furnishing the machinery for the King Locomotive Works, soon to be established in Bordentown, N. J.

The Tyler Tube Works, of Boston, will remove to Washington, Pa. Eight acres of land have been secured. The contract for new buildings has been let. There will be two buildings, 80 x 120 and 80 x 200 ft. in size, which will be completed in March.

The Shaw Electric Crane Co., Milwaukee, is building a 40-ton double trolley electric hauling crane for the new shops of the Union Pacific at Cheyenne, Wyo.

The stockholders of the Southern Equipment Co. held their annual meeting in the Montague Block, Chattanooga, Tenn., last week. The election of officers resulted as follows: J. R. Ryan, President; Frank Eastman, Vice-President; A. B. Coe, Superintendent of Equipment; G. W. Coe, Secretary; G. M. Chapman, Treasurer.

The Dunham Manufacturing Co. has received further orders from the Boston & Maine and Boston & Albany railroads for the combination of the Davies steel lock spike and Servis tie plate. The tie plates in this instance are 6 in. broad.

Iron and Steel.

The Addyston Pipe & Steel Co. held its annual meeting last week. The officers elected were: M. Addy, President; W. P. Anderson, Vice-President; J. H. Domhoff, Secretary; B. F. Houghton, Treasurer. It was decided to increase the capital stock from \$1,200,000 to \$1,500,000, and the additional stock was all taken up by the stockholders at par.

Upon the application of Thomas B. Taylor and other stockholders, a receiver was appointed last week, in Steubenville, O., for the Spaulding Iron Works, at Brilliant, near Steubenville.

Thomas Carlin's Sons, of Allegheny City, Pa., have recently shipped a 6-ft. ore-grinding pan to the Linden Steel Co., of Pittsburgh, and are completing two pans for the Homestead Steel Works of Carnegie, Phipps & Co. One of their dry pans was recently put in the plant of the Allegheny Bessemer Steel Co., at Duquesne, Pa., and several others have been placed in different plants in Pittsburgh.

The Union Foundry & Machine Co., of Pittsburgh, is being organized by F. N. Hoffstot, James M. Bailey and others. The works will be located on the old Clinton mill property, on the South Side, Pittsburgh. The foundations for the new foundry and machine shop have been laid. The new foundry will be 120 x 90 ft. The machine shop will be 60 x 100 ft. The works will be operated exclusively on heavy mold gearing.

Work is progressing well on the Monongahela Furnace Co.'s plant at McKeesport, Pa., and four of the seven large copper stoves are completed. The stoves are 80 ft. high and 21 ft. in diameter, and the iron work was done by Riter & Conley, of Pittsburgh.

The Glen Iron Works, at Allentown, Pa., were recently sold by order of court, under a foreclosure of mortgage, to the Allentown Rolling Mill Co., for \$45,000. The plant has been operated under lease by the last named company for some years.

The Colorado Coal & Iron Co. proposes to erect two new blast furnaces at Pueblo. The output of pig iron has been increased lately. The steel rail plant is expected to add largely to the revenues of the company; inquiries already made indicate that the output can be readily sold to the Colorado roads. The company has the raw material on its own property to make steel rails. The pipe mill will soon be at work, and will turn out about 50 tons per day.

The Rail Market.

Steel Rails.—The principal transactions during the week have been made by eastern mills, 5,000 tons for the south and 3,000 tons for the West Shore. Chicago mills are reported to have sold 11,250 tons of 35-lb. rails for the new

Alberta Railway & Coal Co., of Canada, at private terms. The other sales at Pittsburgh and Chicago have been small ones. There are numerous inquiries in the market from projected roads. The quotations of eastern mills are \$35@ \$36, Pittsburgh, \$36 cash at mill, and Chicago, \$38.

Old Rails.—Few transactions are reported in old iron rails, and the market is weak both in the West and the East. Several lots of foreign double heads are offered in New York at \$27 ex-ship. At Pittsburgh 500 tons have been sold at \$28.50, and at Chicago bids are not above \$25.

Track Fastenings.—Angle bars are \$2.10 delivered, and spikes are nominally \$2.20@ \$2.25.

Coffin's Fare Register.

Mr. A. W. Coffin, of San Francisco, an attaché of the general auditor's department of the Southern Pacific, has invented a conductor's punch and register for cash fares. It is a sort of box punch, 5 in. long, 1½ in. wide by 1 in. thick. It weighs about 15 ounces. It is made entirely of metal and is nickel plated. There is a hinged lid at either end, and the tickets to be delivered to the passengers who pay cash on the train are printed upon long strips of tracing cloth. At one end of the register inside there are two small spindles, around which these strips of tracing cloth are wound. The strips are drawn through the register to the other end, where one strip is wound on a spindle as the other is torn off in segments and delivered to passengers. Each segment is a numbered ticket, and has its duplicate wound about the spindle inside. Along the face of the register there are three rows of small thumb keys, one denoting dollars, another dimes and another cents. When the conductor wishes to deliver a ticket to a passenger who has paid him \$5.45, for instance, he presses down upon key No. 5 in the dollars row, key No. 4 in the dimes row, and key No. 5 in the cents row. This perforates the two strips of tracing cloth inside the register for \$5.45, much the same as a bank stamp would, with needle points. The conductor then turns a small thumb screw and reels out the punched ticket, while at the same time the duplicate is wound upon the spindle in the end of the register. He marks on the back the station from and station to. When he reaches the end of the run the register is opened and the exact amount of money he has received for tickets delivered is found by adding up the amounts punched upon the strip of tracing cloth. A long screw holds the lids of the register securely closed while the seal of the company is placed in the cup-like indentation into which the head of the screw sinks. The conductor is prohibited from breaking this seal, and without getting at the inside of the machine it is absolutely impossible for him to do anything but make a perfect record of the tickets given out to passengers.

It is not very clear that this device is superior to the ordinary duplex ticket. The passenger might be more likely to take some interest in reading the ticket, because the figures are more conspicuous than those indicating an amount collected on a printed "duplex." But the instrument as shown contains but a limited number of tickets, and has figures only for sums less than \$5.55, and in even fives. Such an amount as \$1.18 could not be shown, and \$2.80 would necessitate the punching of two dollars, five dimes, and three dimes. The use of a pencil by a conductor is objectionable, unless there is a decided advantage over methods by which the whole ticket can be made out with a punch. These objections have much less force, however, on a road of long distances between stations and of thin traffic than where conductors have to do much work in little time.

The Phonograph.

The reader will have noticed the last week the advertisements of the North American Phonograph Co. offering for subscription 20,000 shares of its capital stock. This company owns Edison's United States and Canadian patents, and controls for 15 years the graphophone. Through the local companies 6,275 of these machines have been distributed, it is said, in the last six months, and the makers are delivering them at the rate of 60 a day. From the testimony of many users, it is evident that the phonograph is now a practical machine, and that its use will spread rapidly. It will take dictation more rapidly and more accurately than the best stenographer, and will repeat the recorded words at any required speed. Consequently a type writer can reproduce at his leisure, and as carefully as may be wished, whatever has been dictated to the phonograph. Any one who has a large correspondence, or who has to make much use of stenographers and typewriters can imagine many advantages peculiar to the phonograph.

Blodgett's Electric Signal Clock.

One of these instruments is being put in operation at the Haymarket Square station of the Boston & Maine, in Boston. The departure of all the trains leaving Boston will now be signaled by this machine, except those at the Old Colony station, and at the Boston, Revere Beach & Lynn ferry station.

Bridge Accidents.

On the 4th an Ohio, Indiana & Western freight train wrecked one span of an iron bridge over the Illinois River, at Bridge Junction, Ill., near Peoria. The engine, tender and three cars went into the river. The cause of the wreck is not stated, the press dispatches merely saying that the bridge suddenly sank under the train. The engineer and fireman were killed.

On the line of the Oregon Railway & Navigation Co., a construction train went through a bridge 68 ft. high near the Dalles, Ore., the bridge foundations evidently having been weakened by floods. The engine got across safely, but the tender fell into the stream and 10 men were killed and 16 injured in the wreck.

A bridge near Wilbin, Ore., was carried away by a snowslide, Jan. 23.

Bids on the Titicus Dam.

On the 5th inst. the Aqueduct Commissioners opened bids for building a masonry and earthwork dam for Reservoir M, on the Titicus River, near Purdy's Station, N. Y. The specifications include a gate-house and other required structures. The proposals were as follows: Washburn, Shaler & Washburn, \$933,065; J. C. Rodgers, \$963,240; M. S. Coleman, \$998,845; Brechand, Poppel & Co., \$1,031,240; O'Brien & Clark, \$1,055,065; T. Thillemann, \$1,061,030; Smith & Brown, \$1,064,810; D. R. Paige & Co., \$1,124,450; Charles Peterson, \$1,140,650; Clinton Stephens, \$1,168,060; Charles H. Raynor, \$1,205,025. The engineers' estimate was placed at \$1,151,000. The dam is to be 100 ft. high and 1,200 ft. long, and will impound 6,000,000 gallons of water. The bids were referred to Chief Engineer Fteley.



Published Every Friday,
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EDITORIAL ANNOUNCEMENTS.

Contributions.—Subscribers and others will materially assist us in making our news accurate and complete if they will send us early information of events which take place under their observation, such as changes in railroad officers, organizations and changes of companies the letting, progress and completion of contracts for new works or important improvements of old ones, experiments in the construction of roads and machinery and in their management, particulars as to the business of railroads, and suggestions as to its improvement. Discussions of subjects pertaining to ALL DEPARTMENTS of railroad business by men practically acquainted with them are especially desired. Officers will oblige us by forwarding early copies of notices of meetings, elections, appointments, and especially annual reports, some notice of all of which will be published.

Advertisements.—We wish it distinctly understood that we will entertain no proposition to publish anything in this journal for pay, EXCEPT IN THE ADVERTISING COLUMNS. We give in our editorial columns OUR OWN opinions, and those only, and in our news columns present only such matter as we consider interesting, and important to our readers. Those who wish to recommend their inventions, machinery, supplies, financial schemes, etc., to our readers can do so fully in our advertising columns, but it is useless to ask us to recommend them editorially, either for money or in consideration of advertising patronage.

The inquiry of the coroner into the causes of the accident on the Louisville, New Albany & Chicago, at Carmel, Ind., Jan. 27, was concluded Jan. 30, but reopened the next day to admit further evidence on behalf of the company. The verdict we have not yet seen. Press dispatches say that "public sentiment is strong against the railroad company." It may be that such a public sentiment actually exists, or it may be that it is only in the mind of the enterprising reporter. In either case the bare statement gives point to what we have often said as to the need of careful investigation of railroad accidents by competent authority, with power to compel the attendance of witnesses, and of such high character that the findings will command the respect of railroad men and of the public. Now investigations into accidents are carried on mostly by coroners' juries and by the newspapers, and what with ignorance, prejudice, irresponsibility, and the desire to make interesting "copy," the truth often has a hard time. It is not wonderful that railroad companies should be reluctant to give particulars of accidents when they know that the chances are that they will be distorted into shape to mislead, and that as likely as not their competitors will be able to cover up damaging facts under similar circumstances. Yet, could all serious accidents be carefully and thoroughly investigated, and the results made public, there can be little doubt that the railroads would be more benefited than the public. Many errors of popular judgment would be corrected; the public would gradually learn what it is reasonable and practicable to demand of railroads; officers knowing that accidents would be followed by searching publicity would be more firm in insisting on the expenditure of money to prevent them, and finally a mass of facts would be collected from which one could make sound generalizations as to the directions in which limited sums could be spent with the most immediate advantage.

So far as we can tell from the evidence now published, the derailment at Carmel was caused by the displacement of a rail. A section master testified that shims had been placed on 16 consecutive ties, and the rail shimmed up had rolled. He said, however, that a truck already derailed displaced this rail. From the evidence of the chief engineer, it seems probable that there were unsound ties in the track, and that some of the timber of the trestle bridge should have been removed. Indeed, repairs had very lately been made on it. A schoolmaster who had lately walked over the track said that the "rails and ties had sunk into the mud until they were much lower on one side than on the other." The accident took place on a three-degree curve. Apparently this schoolmaster had never heard of superelevation, but his testimony would very likely seem to the jury very damaging, as it did to the reporters. He also testified that the heads of many spikes stood an inch above the rail flanges. This is one of the very cases where those responsible for the care of the track of other railroads would like

to know whether or not the shims used were substantial and sound and well spiked to the ties; whether or not the ties were sound and the spikes well driven, and whether the displacement of the rail was the cause or the result of the derailment. Until these facts are known the lesson to be drawn is rather obscure.

Engineers of maintenance of way and roadmasters can find considerable comfort in the table which we published last week, giving train accidents for 17 years, classified according to their causes. From that table it will be seen that the derailments due to defects of road were in 1889 fewer in number than in any one of the eight years preceding, notwithstanding the increase in track mileage and train mileage. The average for seven years was 172 derailments annually from defects of road, while in 1889 there were 120. Per million train-miles the average was for the seven years, 1882-1888, 0.298; and for 1889 it was 0.16 per million train-miles. The decrease in frequency of derailments of this class was about 46 per cent. These figures, of course, are not given as being entirely accurate, but they cover so long a period that the averages must give a pretty close approximation to the truth. They show a very substantial improvement, and taking the ratio of derailments to train miles, the improvement has been pretty steady. It appears chiefly in the items of "broken rails," "spread rails," and "defective switches." How much of it has been in material and how much in work one cannot judge, but doubtless both elements have played an important part. With better track fastenings which are sure to come steadily into use, we may expect still further reduction in accidents of this class. An occasional broken rail can hardly be avoided; but a "spread" rail really ought not to be classed as an accident. It is almost a crime.

It is a little hard, amid contradictory reports, to get at the real truth with regard to the control of Reading stock. There seems to have been some general transfer of ownership, and statements are confidently made that there is now a majority adverse to Mr. Corbin. Just after the election it is easy to make such statements, and of comparatively little use either to affirm or to deny them. Most of the talk about the effect of the change on lawsuits is little better than nonsense. If Mr. Corbin has done illegal acts, it does not require a majority of stock to obtain redress. If he has not done anything illegal, the most overwhelming majority cannot dispossess him till the next election. That is a long way off, and a great many things may change between now and then. If an adverse majority were held by a very few individuals, or tied up in a trust, it might mean something with regard to the future policy of the company; but an opposition so loosely organized as is that in the Reading at present, is liable to go to pieces in the course of a few months. "Brer Fox, he lay low." So, apparently, does Brer Corbin.

The most important point about the threatened withdrawal of the Union Pacific and Chicago & the Northwestern from the Interstate Commerce Railway Association is the fact that nobody attaches much importance to it. Perhaps a compromise will be patched up; perhaps not. In any event, it makes comparatively little difference with the immediate future whether these roads are in the agreement or out of it. If a company is disposed to be peaceable, it makes very little difference whether it stays out. If it is disposed to be quarrelsome, the agreement is not strong enough to control its fighting propensities. All that the association can do is to insist on certain formalities which must be observed in connection with joint rates or through traffic. How purely formal these requirements are is shown by Mr. Adams in his letter. Had the Union Pacific and the Northwestern chosen to consolidate, there would have been nothing in the agreement to prevent it; but a comparatively unimportant agreement as to the handling of through traffic is regarded as a violation of rules, even though rates are not in the least affected by it.

"Dangerous Retrenchment."

The following paragraph is copied from a Western paper, the name of which we have lost, but it was taken first, we think, from the *Indianapolis Journal*. It embraces some pertinent criticism and recounts circumstances which agree so closely with what we have heard directly from other railroad officers that it seems worthy of more than a passing notice:

A railroad official speaking of the numerous accidents of late expressed the opinion that it was largely due to the mania for cutting down expenses. Salaries are cut down until thousands of good men are leaving the service to go into something more remunerative, and these places are usually filled by young men, some of them not

out of their teens. Especially is this true in telegraph offices. At way stations as soon as a boy gets so he can send a message he is given a position at some small station. Then, again, men who are careless are not properly punished. He cited a case where, through the forgetfulness of a young operator, who was in the train dispatcher's office, there was a collision, and three lives lost and \$40,000 damage done. The dispatcher was of course discharged. In less than a week he was in the train dispatcher's office of another important road, and is there now, and boasting that it was a fortunate thing for him, as he is now getting \$15 a month more than he did on the road from which he was discharged. In addition to this there is gradually creeping into the train service a class of men that are reckless and less intelligent than those who have been dropping out.

In appointing and promoting trainmen, station agents and operators, a superintendent is constantly under pressure from two opposite directions. From his own experience and knowledge he has an overwhelming sense of the many high mental qualifications necessary to the proper performance of the duties of positions like these, and so is never satisfied with the candidates before him until he has thoroughly examined every person within the field available. On the other hand, the stern necessity to restrict or reduce expenses, which, either from low earnings or from the determination of the directors to pay larger dividends than they ought, presses on every superintendent about 11½ months out of every 12, compels him to take such men as he can get for the money available. The rate of wages is rigidly fixed, and the number of men in each class being large, any change in it is hard to bring about, whatever reasons there may be for making it. Reining up his force to a higher standard, which should always be a superintendent's aim when help is plenty, is generally a matter hardly thought of, because the directors have always taken care to keep the wages rate low enough to prevent any influx of men better than the average. It is difficult enough to keep the men up to past standards.

In the earlier period of railroad operation, when business was all the time rapidly expanding, the best men were selected from the whole body of applicants available, with little regard for experience. This was necessary because experienced men were scarce. Later methods, more or less closely copied after "civil service" systems (and always dignified by that name), have secured the advantages of experience by promoting men from lower grades; but in doing this the element of natural ability is necessarily sacrificed to some extent. In a rational view of the case, a conductor or a station agent ought to have both the natural ability formerly common, when the superintendent picked up the smartest fellow he could find and paid him about what he asked, and the experience which is now secured by taking the man from the next smaller station or train, but which, as in all rigid systems, may or may not be accompanied by the capacity requisite for the higher place. But experience is a factor which can be definitely estimated and accounted for in figures, while natural ability is less tangible and is dependent for its market value more upon the individual view of some officer; so there has come to be prevalent an undue dependence upon and confidence in machine methods which make sure of experience whatever they do not secure. Many officers, especially those who are far enough removed from these grades to be little troubled by the vexations connected with details of work and discipline, convince themselves that in thus recognizing the value of experience they have taken the very best course possible. If there is any retrogression in the quality of the service accorded the public, they say it is not sufficient to be visible. We continue to make money; we do as well as other roads do; whom can we get except our own experienced men? Moreover, we must practice "civil service" methods in order to do justice to our men and keep them contented.

And beyond all this, the deterioration in the personnel resulting from the employment of machine methods which ignore special fitness has often been so evenly spread over the whole system and has manifested itself so gradually, and in many cases has been so wholly invisible except to careful and farsighted observers, that many managers have gone a step farther. They not only reject the plan of first selecting their man and then fitting the pay to him, and in place thereof fix the salary first and get the man to fit it. They reduce the salary, with the evident intention of seeing if the qualifications of applicants will not remain at their former standard in spite of the reduction. As the country has grown and labor of all grades has become more plenty, as it has been seen that in nine hundred and ninety-nine cases out of a thousand an ordinary engineer, operator or brakeman answers as well as one who is above the average, the temptation to get along with "average" men has been too strong to resist. Thus the best men have been gradually crowded out. Some have been promoted in the railroad service itself

and others have promoted themselves by going into other business. This is plainly evident in some branches of the service, and is undoubtedly true of others where the state of things cannot be defined in exact terms.

The telegraph service affords one of the best illustrations. This branch was not so large a feature of railroad work 20 years ago as it is now, and railroad officers are not to be regarded as responsible for the course affairs have here taken, but the bearing of the facts on the question under discussion is not affected by that. The wages of good operators have been reduced about 30 per cent. in 20 years. Allowing, for the sake of argument, that the young man who now receives \$40 or \$45 is equally expert and reliable as an operator with one who, at the same age, in 1870, received \$70, it remains true that he will not remain so long in the service, because the emoluments of the various other callings which appeal to him have not been reduced in equal proportion. The employer, therefore, will have a smaller proportion of experienced operators, and will correspondingly lose the benefits of experience, and the prospect that a telegraphic career will be shorter now than formerly will inevitably repel some of the more intelligent and capable persons who otherwise would enter the service. And when we consider the cases where wages have been reduced from \$70 to \$35 instead of to \$45, and those where the superintendent has concluded that a second-class operator will answer just as well as a first-class one, there is no difficulty in explaining why the service is not perfect. Precisely the same forces have been at work in other lines of railroad work, and both explain and justify the remarks of the officer quoted at the opening of this article.

A superintendent is likely not to appreciate the need of good men unless he closely watches his force and sees how frequent are the errors that are precisely like those which cause the \$40,000 wrecks mentioned by our friend quoted above, but the evil consequences of which are averted simply by "good luck"—nothing else. We lately heard of another dispatcher who was equally reckless, but who did not precipitate a collision. He was found out and discharged, but, like this one, he immediately got a good situation on another road.

The homely old motto "safety first, speed afterward" is not followed. A dispatcher who can "hustle" the trains is preferred to one who is overcautious. The superintendent does not consciously make this decision, but his course really results the same as if he did. To pay a man of five years' experience 10 or 20 per cent. higher wages, simply because he asks it, when a bright young man of six months' experience stands ready to take his place, seems a waste of money, and when 18-year old boys are making "brilliant" records on all sides and the directors are insisting on a reduction of expenses this sense of extravagance is overwhelming; and yet the few years' experience that here hangs in the balance occasionally marks the difference between life and death to two or three passengers or trainmen.

In speaking in this way about an increase of pay, we do not forget that with large classes of men the rate of pay must be raised or lowered as a whole. If a brakeman is especially capable and his pay is raised \$5 a month, it of course disturbs all the brakemen on the road. But the principle is just the same. To get better brakemen more money must be paid, and to get the money the directors must be made to see the difference between best and second best; and in arguing with them the superintendent will do well to confine himself to single individuals. And it is not so hard, either, to make modifications in the rate of pay for different individuals if one resolutely sets out. An annual prize for a perfect record will at once set in operation a sifting process which will prove a potent educator. If the standard is closely watched and raised when necessary, such a prize will return much more than it costs. It can be applied to others than brakemen.

Passenger Trains Under Government Management.

The advocates of state railroad ownership look to Prussia as their ideal. It is there that the experiment has been tried on the largest scale. Nowhere else has so much intelligence been applied to the problem of government management. Nowhere are the conditions for its solution so favorable. The central authorities have almost absolute power, and are not dependent upon popular votes. The civil service commands the best talents of the nation, and its administrators are probably better trained than in any other country. The people are so accustomed to depend upon government action that the plans of a state authority meet with little opposition, and have every facility given to make them successful.

The experiment has been for twelve years on trial.

In some respects the results have been unquestionably good. Rates are, on the whole, quite low; passenger rates exceptionally so. Though traffic has not grown rapidly, it has been by no means at a standstill. Special rates are being gradually reduced in importance; in their very worst forms they have been pretty much abolished. There have been no scandalous abuses in railroad management; on the contrary, the general economy has been so good that the railroads have paid five and six per cent. on the investment, or considerably more than the interest on the government loans which were used in purchasing them.

So much for the good side of the case. The evil results are seen in a loss of efficiency—or at least in a failure to keep pace with the improvements which other nations are making in this respect. Many of the methods which have so nearly revolutionized American railroad operation are practically unknown in Prussia. She is far behind in the introduction of air brakes, and is not proceeding very intelligently even at this late date of beginning. Prussian car construction shows surprisingly little change as compared with ten years ago. Prussian official routine in railroad matters has in many respects gone backward. Instead of increasing efficiency by labor-saving devices, the officials simply make work by unnecessary red tape. In a recent number of *Die Nation*, a well-known expert has criticized the present state of affairs most unsparingly. He goes so far as to charge the government with trying to suppress all intelligent comment in order that the German people may not know how far they are falling behind England and America in the efficiency of their railroad service.

The unprogressive character of the Prussian government management is seen in the small amount of train-service, and especially fast train service, in proportion to the population. The German railroad guide of 1887 showed no advance of any importance over 1877. In some cases it showed a retrogression. Down to 1877 Germany was served by competing private companies, which kept pace with the world's progress. When the government bought them the progress stopped. Messrs. Foxwell and Farrer, in their interesting work on "Express Trains, English and Foreign," comment severely on this fact. They say:

As far as one subject—express trains—is concerned, the acquisition of private companies by the state has had an exceedingly bad effect. From Berlin to Frankfurt there were three competing lines, and about the year 1875 the service was the finest on the Continent, and quite equal to any in England. But now in England our private companies have been steadily progressing in speed and cheap accommodation, whereas the German Government railways remain with the same speeds, and with the same accommodation (as far as cheapness goes) as before. It is noteworthy that the old competing trains run over much the same ground, and at the same hours, as in old days, showing that the Government have not dared to take off the accommodations which were given by competing expresses to intermediate towns. Again, a government system has not the interest which private companies have in developing new cross-country services. For instance, the traffic between London and Berlin, both by Calais and Flushing, is taken at least 20 miles out of the shortest route, because a great monopoly can afford to waste a longer time over the journey, in order not to have to spend money on building cross-country lines, or improving junctions and services. Political considerations may also tend to bad arrangements. Then between London and Berlin the services *via* Calais are simply an international disgrace, from the dislike of the Germans to send their mails through France, which they would be compelled to do if this natural route were worked to full advantage.

The Prussian authorities do not rest wholly quiet under criticisms like this. They have at some points improved their train service over that of 1888; and we may expect further improvements during the current year. They also seek to break the force of Mr. Farrer's comments by impugning some of his statistics. A writer in the *Archiv für Eisenbahnwesen*, goes into a number of details; but in his efforts to defend the Prussian management, he makes matters in some respects worse. He takes issue with Mr. Farrer as to the success of his efforts to limit the use of the term express to trains which run over 20 miles an hour including stops. The German writer thinks it right to include among express trains whatever the authorities call an express, even if it runs less than 20 miles an hour. Acting on this basis, he makes up a table showing that Prussia has a daily express mileage of about 29,000. This is about as severe a condemnation as anybody can want. It shows how totally inadequate is the service even of moderately fast trains. Working on the same standard of speed as these so-called Prussian expresses, we find that New Jersey has a daily express mileage of something like 15,000. With twenty times New Jersey's area

and population, Prussia has only twice New Jersey's express train service.

Another comparison will put the contrast still more clearly. The second largest city in Prussia is Breslau. It has something over 300,000 inhabitants, and is a little more than 250 miles distant from Berlin by each of three alternative routes. The distance is thus a little more than that from New York to Boston. Between New York and Boston there are ten expresses, nearly all making the journey in 6 or 6½ hours. Between Berlin and Breslau there are, or at least were until very recently, only three expresses, the fastest taking seven hours for the journey. It is easy to see how totally inadequate such service is when judged by an English or American standard.

The Germans may say, and in many instances do say that they do not want fast trains. The writer in the *Archiv* considers that train speed may be purchased at too dear a sacrifice. In this he is undoubtedly right. But the speed of fast trains means something more than the saving of time to the few passengers who travel on them. It even means more than quick transit of mails and rapid communication between different sections. It means a progressive spirit on the part of the railroads and of those who use them. A government which uses its monopoly in such a way as not to meet this demand, neglects progress itself and suppresses it in others. No matter how strong Germany's military system, she cannot afford to fall behind in the race of industrial efficiency. The failure to keep pace with modern developments in railroad transportation is a most dangerous symptom, and one which her people cannot afford to treat lightly.

Long Runs.

The New York Central has for some time been running passenger conductors and brakemen through between New York and Buffalo on three trains each way, daily, and through crews have now been put upon four others, making fourteen trains which now make the run of 439 miles daily, each with a single crew. These trains all run at high speed, and most of the trips are completed in 12 or 13 hours if no delays occur. (One, however, takes 15 hours.) Each crew makes about 1½ round trips per week; that on the Chicago limited, for example, running from New York to Buffalo on Monday, from Buffalo to New York on Tuesday, and then lying off 48 hours. The average daily mileage for each crew is about 220 miles. Conductors who formerly earned \$100 per month, making trips of 150 miles, and lying over much shorter periods than now, receive \$125 per month under the new arrangement. One of the chief objects in making this change was to relieve the passengers of the annoyance of presenting their tickets three times on a trip between New York and Buffalo. It seems that the new runs are sufficiently attractive to the men to make them eagerly sought for. Whether this results from the increase of pay or the decrease of work, or both, we do not know.

This plan summarily demolishes some of the theories of the eight-hour advocates, who always present as one of their chief arguments the necessity of regular and frequent relaxation and the unhealthful and dangerous effects of long-continued strain on the mental faculties. The acts of the British Parliament, under which the Board of Trade has investigated the hours of labor of various employés on English railroads, tacitly assumes that 12 hours is the utmost reasonable limit for a day's work. It would seem that the New York Central is working fully up to this limit, and, in fact, going a little beyond it. Its action must be predicated largely on the feeling which is prevalent in many quarters, and which has more or less rational basis, that the work of passenger trainmen is now very light. It is doubtless true that a conductor—say, of the fast mail—can, if he be of the right temperament, run a train from New York to Buffalo with an exceedingly small amount of mental wear and tear. He has few, if any, tickets to take up, and few, if any, cars to leave or take. In fact, if he be an old freight conductor, he will not be incapable of discovering sufficient opportunities to get a fair night's rest between 9 p. m. and 9 a. m. while still ostensibly performing his duties.

But we are by no means certain that the Central is not carrying this idea too far. The conductor of a passenger train should always be fresh and alert. Theoretically he must be as wide awake at the close of his trip as at the beginning. If in practice this is not always true, it is largely because superintendents have not required it. In making schedules 12 hours long no margin is allowed for delays. It is true that serious delays are now rare as compared with former times, but when an emergency occurs the need is as bad as ever. There is an advantage in having trainmen who are familiar with long stretches of

road, so that in case of a scarcity of men by reason of a blockade, a strike, or other cause, any man can be placed on any train; but here again there is danger of assuming too much. The chances are that a conductor who knows 400 miles of road will not possess a very intimate acquaintance with it. The British accident reports have brought out several cases where an engineer mistook a signal on a section of road with which he was understood to be familiar, but which, it appeared, he had not run over for several months or years, and perhaps then only as fireman. Of course, the Central conductors have not the same duties as engineers, but the necessity of having conductors acquainted with the road over which they travel is not based entirely on fancy, by any means. Delays to passenger trains by reason of disabled freight trains in their path are frequently made longer and more annoying than they would otherwise be by the inability of the conductor to quickly grasp the situation and discover a means of getting out of his difficulty; and enlarging a conductor's territory increases the chances of this inability showing itself.

The New York Central provides good places for its men to rest in when off duty, but it is doubtful if the average trainman will make good use of 48 hours' continuous relief from work every four days, even with such a sumptuous place as the Vanderbilt building to loaf in. Mail clerks who rest one week out of every two or three are required, we believe, to employ the off week in studying geography or otherwise perfecting themselves for their work. Perhaps a railroad might profitably consider something of this kind. The newspaper paragraphers would suggest that the brakemen study elocution.

A passenger was killed on the Boston & Maine a fortnight since by getting off a passenger train at a station on the "off-side," and being struck by a slowly moving empty engine on the adjoining main track. The passenger alighted before the train stopped, and there was lack of judgment in signaling the empty engine, but the State Railroad Commissioners, who investigated the case, lay chief stress on the matter of gates. It appears that all the cars in the train were equipped with platform gates, and that the commissioners have in past years recommended the roads of the state to use such a safeguard, but they were not closed in this instance, and the superintendent testified that passengers objected to them and threatened to jump over if they were used. The Commissioners very justly reiterate their recommendation, and apply it specifically to "all divisions of the Boston & Maine road." It is true that passengers will "kick," and that with the ordinary car platform it is not easy to make a perfect barrier, but a well designed gate, such as may be seen on the Boston & Albany and the New York & New England, is a valuable means of warning passengers that there are bounds beyond which they can go only at their peril. It is one of the wonders of modern civilization that so many hundreds of passenger trains daily discharge their passengers at stations where express trains pass by within 4 ft. of unprotected steps, and at speeds from 15 to 30 miles an hour or faster, without killing more passengers than they do. The American traveler who does not have his wits about him is a very infrequent fellow, comparatively, but he needs to be looked out for nevertheless.

The Westinghouse friction buffer draw gear will be exhibited in Chicago this week on a train of twenty-five cars. The exhibit will be made on Saturday afternoon, Feb. 8, at the Lake Shore & Michigan Southern yards between Englewood and Grand Crossing. This exhibit will be one of a series arranged by the Union Switch & Signal Co., to take place in various parts of the Western, Middle, and Eastern States. A few days since a train left Pittsburgh equipped with these buffers and having in the rear a Pullman hotel car, as was the arrangement with the famous train which exhibited the Westinghouse quick-acting air brake. This train is in charge of Mr. R. H. Soule. Between Pittsburgh and Chicago the train passed over the Fort Wayne road. Going east it will go over the Lake Shore and the West Shore roads to New York. Trials will be made in Cleveland, Buffalo, Syracuse and Albany. The purpose of the tests is to show the action of the springs and friction plates, which act both when pulling and when pushing. The recent tests at Altoona were made by attaching two consolidation locomotives at one end of the train. These engines were reversed from forward to back gear quickly, which caused the friction buffers to open and close, and thereby exhibit their action. Those receiving invitations to visit the tests at Chicago will take the train at 2:15 p. m. from the Lake Shore station.

We have received from the London, Brighton & South Coast Railway, England, through the kindness of the late Mr. Stroudley, a drawing showing a passenger truck constructed from his designs almost entirely of pressed steel. This truck has probably fewer parts and the least weight for the load it carries of any truck that has yet

been produced. It is a four-wheel, swiveling truck with swiveling bolster. On it is mounted the air-brake cylinder, working directly on the brake beams, together with the auxiliary reservoir. This design illustrates the increased attention being paid to the uses of pressed steel for the construction of railroad equipment in England, and in this country there is a tendency to use such material wherever possible. One of the most recent adaptations is that of the pressed steel grain door, of which 500 have just been put into use on the Michigan Central road. A recent examination of this door showed that it could not be removed, nor injured so that it could not be used without the use of a hammer, chisel and monkey wrench. A door of this sort removes one of the difficulties with cars loaded with grain whose wooden doors are nearly always broken or badly battered in opening, the contractors who unload the cars having but little respect for their welfare.

The Governor of Nebraska has written an angry and somewhat demagogic letter to the Trans-Missouri Association with reference to its failure to reduce rates on corn. It seems that he had sent a request for such reduction some little time ago, and that the Association was actually considering how the matter could be arranged; but a Chicago newspaper telegram led the Governor to believe that the whole subject had been shelved, and he acted on that supposition. The letter itself does not contain much that is noteworthy. It says that the railroads can just as well make a reduction as not, and that the farmers will make trouble if present rates are maintained. The first proposition is probably untrue; we hope that the second is equally so. In any event, it would be a mistake to attach too much importance to the utterances of a public officer who bases his action upon unconfirmed newspaper telegrams. A majority of the members of the Nebraska State Board of Transportation have come to Chicago to present their demands to the railroad officers.

As is well known, various railroads west of Chicago have shown their friendliness to local ticket agents in the East, since the abolition of commission payments, by sending them annual passes, good for the agent and his wife or sweetheart. This has been to some extent for several years, and it does not appear that many of the ticket sellers have been able to secure a vacation sufficiently long to make much use of the privilege granted them. But the Pennsylvania Company and Lake Shore & Michigan Southern have just issued orders to their local agents to surrender such passes. According to reports, the Pennsylvania order is aimed at passes issued by the Chicago, Burlington & Quincy, and the Lake Shore at those issued by the Denver & Rio Grande. Why other roads are not included is not apparent. It is doubtless true that this is a means of influencing business not wholly ineffectual, although in most cases the pass has no money value to the recipient.

General Manager Furber, of the Boston & Maine, has issued an order forbidding signs or advertisements being placed or printed on the fences of the road. There are about 3,500 signs between Boston and Portland, which the company will have painted out. This is a very sensible proceeding. The task is not an easy one, for, like killing mosquitoes, it has to be done over and over again in many places; but we admire Mr. Furber's grit. Others who have not already taken similar action should go and do likewise. We trust the farmers living along the line of the Boston & Maine do not allow signs in letters three feet high to be painted upon the roofs of their barns. Between New York and Philadelphia advertisements of this sort are disagreeably obtrusive. No possible effort of the railroad officers can thwart the scheme under such circumstances, unless the brakemen are instructed to murder the paint-pot man when he sallies forth from Philadelphia on his wicked errand.

A correspondent sends us the following list of railroads that, since January, 1888, have adopted rail sections having in the head less than 45 per cent. of the total area:

Chicago & Northwestern	1889	72-lb. rail.
Chicago, Milwaukee & St. Paul	"	75-lb. "
Chicago, Milwaukee & St. Paul	"	60-lb. "
Northern Pacific	"	66-lb. "
"	"	56-lb. "
Oregon & Washington Ter.	"	65-lb. "
Union Pacific	"	75-lb. "
Milw., Lake Shore & West.	"	60-lb. "
Illinois Central	"	72-lb. "
Chesapeake & Ohio	1890	75-lb. "
Chicago, Rock Island & Pac.	"	70-lb. " (under discussion)
Duluth & Iron Range	"	75-lb. "

Besides these we mentioned in a note on the new Erie rail last week the following:

Michigan Central	1888	80-lb. rail.
New York Central & H. R.	1884	80-lb. "
Chicago, Burlington & Q.	1889	85-lb. " (Delano section).

NEW PUBLICATIONS.

Transactions of the American Society of Civil Engineers.—The numbers of the "Transactions" for October and November are received. That for October contains the report of the committee on the proper relations to each other of rail and wheel sections, with a very extended discussion of the subject by many members of the Society, and an appendix giving extracts from nu-

merous letters received by the committee. Altogether this is a document of very unusual interest and value. Those who are not members of the society can obtain copies through the Secretary, Mr. John Bogart, 127 East Twenty-third street, New York City.

The November number contains a paper by Mr. John R. Freeman, on Experiments relating to Hydraulic Fire Streams, with discussion by various members.

The Journal of the Iron and Steel Institute. (Great Britain.) E. and F. N. Spon, New York and London.

This volume, 542 pages, contains the papers and transactions of the Institute for the latter part of 1889. It includes an account of the meeting of the Institute in Paris, with the President's address and papers on French Iron and Steel Manufacturing Plants, on the Proposed Channel Bridge, on Gaseous Fuel, the Thomson-Houston Electric Welding Process, Alloys of Iron and Silicon, a New Form of Siemens Furnace, and the Robert-Bessemer Steel Process. The volume contains a large number of notes on various subjects connected with mining, metallurgy and iron and steel making, and has a very full index.

Commerce of the United States and other Foreign Countries with Mexico, Central America, the West Indies and South America.—This is one of the publications of the Bureau of Statistics of the United States Treasury Department, the contents of which are sufficiently indicated by the title. It is one of the series of special reports issued by that bureau but for the information of the International Congress, and, in view of the public interest in the matters covered, large additions have been made to the information heretofore presented in the same reports.

The Railroad, Telegraph and Steamship Builders' Directory. The Railway Directory Publishing Co., 18 Cortlandt street, New York.

This is a volume purporting to be a classified directory of houses in the United States engaged in the manufacture of material and supplies of all sorts for railroads. The directory includes not only the names that would be included in an ordinary list of railroad supply men, but builders of cars and locomotives, bridges, steamships, telegraph lines, etc., and makers of electrical apparatus. A list is also given of purchasing agents and of railroad officers in charge of rolling stock and shops.

Transactions of the American Society of Mechanical Engineers. Vol. X. This volume contains the transactions of the Scranton meeting, October, 1888, and the Erie meeting, May, 1889, accounts of which have already appeared in the *Railroad Gazette*, with abstracts of many of the papers and discussions. It is needless to say that the volume is got up with great pains, and has a very good index. Bound with this volume are also a table of contents and general index for the volumes I to X, inclusive, together with a few errata for various volumes.

The Stevens Indicator. The January issue of this number has a very good table of contents. It gives a portrait of Ericsson, with a biographical sketch by Prof. C. W. McCord. Among the other papers are treated the subjects of Transmission of Power by Wire Rope, by William Hewitt; the Most Economical Engine for Small Power, by Professor Denton; Testing Machines, by E. C. Henning, and Cable Traction as Applied to Elevated Roads, by C. W. Thomas.

Publications of the American Statistical Association.—The issue for December, 1889, contains Financial Statistics of the American Commonwealths, by Prof. E. R. A. Seligman; Divorce in France, by Benjamin F. Keller; Relief of the Poor in Germany, by Prof. A. G. Warner, and numerous short notes on various subjects. Copies may be obtained from the Secretary, D. R. Dewey, Ph. D., Massachusetts Institute of Technology, Boston, Mass. Price \$1.

TRADE CATALOGUES.

Illustrated Catalogue of Hoopes & Townsend, Wilmington, Del.—This catalogue contains illustrations, tables of dimensions and prices for a large variety of bolts, nuts, rivets and kindred articles. The product of this company is too well known to require special mention. The bolts are threaded to the United States standard gauges and made of uniform dimensions. One table of particular importance gives the dimensions and price lists of cold punched nuts, chamfered, trimmed and drilled, which are largely used in car work by many railroads. Estimates for all classes of work are invited.

Price List of Carnegie, Phipps & Co., Limited, Pittsburgh, Pa.—This is a little volume convenient for the pocket or desk, containing sizes and price lists of an immense number of shapes in iron and steel. Very many lithographs are given also, showing I-beams, channels, angles, tees, and columns in great variety. An interesting feature of the book is the illustrations of the Z-bar columns for a variety of structural purposes.

The Industrial Light Company, of Temple Court, New York City, has issued a catalogue illustrating the appli-

cation of the Lucigen light. It contains cut representing the various applications to which the light is put, letters of commendation, and references from prominent corporation and railroad companies. Those interested can obtain the catalogue from the company.

TECHNICAL.

Automatic Brakes and Couplers.

The Chicago & Northwestern will put on about 4,000 M. C. B. couplers this year, and about 2,000 sets of the Westinghouse quick-action freight brake.

Quick Work.

The Hamilton street shop of the Baldwin Locomotive Works has been operated for several years past (24 hours a day) by a Westinghouse 200 H. P. standard engine, which is one of a dozen or more of the same kind in use in this establishment. They have recently been replacing their larger engines with Westinghouse compounds for the purpose of gaining the greater economy due to the use of the latter. They recently had occasion to make a change from the 200 H. P. standard Westinghouse to a 250 H. P. Westinghouse compound without stopping the works. The standard ran the shop until 6 o'clock p. m., when it was stopped, disconnected and removed from the foundation; the 250 H. P. compound was put in its place, connected up, pipes run, and was in operation at 3:30 a. m. This is probably as quick a change as was ever made with engines of such a size. This would probably only be possible with a self-contained engine, which can be completely erected and tested in the shop in which it is built.

Incline Plane for Steel Works.

The Berlin Bridge Co., of East Berlin, Conn., is building an iron incline plane, 400 ft. long, for the Duluth Iron & Steel Co., at Duluth, Minn. It is built at an angle of 30 deg., and extends from the stock-house on the ground level to the top of the furnace stack, about 95 ft. high. The girders are supported by four latticed towers. The Berlin Iron Bridge Co. also has the contract for putting up a boiler-house over a battery of 16 boilers for this company. It is to be constructed entirely of iron, iron posts and trusses, and the top and sides are to be covered with corrugated iron.

New Bridges in Australia.

According to the *Colonies and India*, four new bridges are to be built over the Murray River, separating the colonies of New South Wales and Victoria, at the estimated cost of £31,500; which is divided as follows: one at £15,000, one at £11,500 and two at £2,500. In addition to which there is to be a ferry boat at Hawksview, costing £200. Each colony is to bear a moiety of the cost.

Thermometers for Passenger Cars.

The New York Central Railroad and the Wagner Palace Car Co., upon the urgent request of the State Railroad Commissioners, have issued orders to place thermometers in cars, with instructions to trainmen to maintain the temperature of each car as near 70 degrees as possible.

Automatic Couplers in New York.

A summary, made by the New York State Railroad Commission shows that there are 35,423 freight cars equipped with automatic couplers out of 180,873 such cars in use on the different railroads wholly or partly within the state.

Another Tunnel in Chicago.

The contract has been let for the construction of the new tunnel under the river from Market street to Clinton street, Chicago. Messrs. Fitzsimmons & Connell have taken it for \$750,000. The tunnel is to be 1,530 ft. long, 30 ft. wide and 15 ft. 9 in. high. Work is to be begun at once, and finished by Feb. 1, 1892.

The Cyclone Snow Plow.

According to a telegram from Truckee, Cal., this machine worked successfully the last ten days of January on the Salt Lake, Humboldt and Truckee divisions of the Central Pacific, in snow banks 10 to 15 ft. deep.

The Louisville and Jeffersonville Bridge.

Work is going forward actively, in spite of the caisson accident. Work on the foundations is about one-fourth finished. The caisson of pier 5, in which the accident took place, is now some 40 ft. below low water, and pier 2 is down 40 to 50 ft. Pier 1 is nearly completed. The caissons for piers 3 and 4 are nearly done, and will soon be launched. Land has been secured for extensive terminals in Jeffersonville.

The Jull Excavator on the Union Pacific.

Accurate details of the work of the Jull snow plow in raising the blockade on the O. R. & N. are not yet received; but from officers of the road it is learned that the Jull opened the way from Baker City to La Grande, about 60 miles. It is now well known that the snow was very deep in that region, and the suffering great. We hope soon to have particulars of the work of this and the other machine plows.

A Critic's Eye.

It is generally admitted that the affairs of the passenger department of the Central Traffic Association since the retirement of Mr. Daniels have been conducted just as efficiently as before, while the salaries of chairman and a large force of clerks, etc., were saved to the roads. But, nevertheless, efforts have been made ever since to secure the election of a permanent Chairman of the Passenger Committee, simply because a number of ambitious passenger officials are anxious to secure a lucrative and easy position.—*The Chicago Esteemed Contemporary*.

Advance in Iron and Steel in England.

In their annual review, C. E. Miller & Co., of Middlesborough, England, give the following figures to show the advance in iron and steel in 1889 in that district:

	Advance.					
	From			To		
	£	s.	d.	£	s.	d.
Rails, heavy sections.....	3	17	6	7	0	0
Iron plates.....	5	10	0	8	0	0
Steel plates.....	6	5	0	9	0	0
Iron bars.....	5	2	6	8	0	0

They report that steel works and shipbuilders have work booked to cover their production for the first half of the current year.

A Prussian Electric Lighting Car.

The Prussian railroad authorities, at Frankfurt on the Main, are fitting up a car, which is to have all of the necessary apparatus and appliances for operating ten arc lights. The car is to be used in the inspection of tunnels and in case of accidents, to promptly furnish an

abundance of light at any desired place. The car will, it is said, be exhibited at the forthcoming electrical exhibition at Frankfurt on the Main. The readers of the *Railroad Gazette* will doubtless remember the illustrated description of a similar car built by the Cumberland Valley Railroad at the Chambersburg shops, which was used by the Pennsylvania in repair work after the floods of last summer.

Metal Brake Beams.

The National Hollow Brake Beam Co. has commenced work in its new shops at Thirty-ninth street, Chicago. The buildings are of brick and well arranged. The machine shop will have a capacity for 1,000 beams per day, but the machinery for such an output has not been put in position. At present there are two special punching machines for pipe, bending machines for rods, testing apparatus, and other special machinery, together with bolt cutters, slotting machines, a lathe and a drill press. The shop is heated on the Sturtevant indirect system, and is thoroughly ventilated with the same apparatus. Adjoining the shop are a store house and a large, well-lighted forge, in which will be placed machinery for the manufacture of the Westinghouse brake beam. Every beam is tested before it is put into service, and all slack is taken up and the parts brought down to a bearing.

A Good Iron Axle.

The following test of a car axle was made by the Chicago Forge & Bolt Co. at their works. The axle was built for the Pullman Palace Car Co. by "straight fibre axle process," which this forge has recently acquired. The material was a first-class scrap iron piled and rolled and then piled again and hammered. The dimensions were those of the M. C. B. axle with 3 3/4 in. x 7 in. journal and 4 1/2 in. at the centre.

No.	Drop.	Deflec.	No.	Drop.	Deflec.	No.	Drop.	Deflec.
blow.	ft.	in.	blow.	ft.	in.	blow.	ft.	in.
1	10	3 3/8	12	18	4	23	19	3 3/4
2	10	1	13	19	3 3/8	24	19	4
3	10	3 3/4	14	19	3 3/8	25	19	3 3/8
4	15	2 3/4	15	19	3 3/8	26	19	3 3/8
5	15	3	16	19	3 3/8	27	19	3 3/8
6	15	2 3/8	17	19	3 3/8	28	19	4
7	15	3 3/8	18	19	3 3/8	29	19	3 3/8
8	18	4 1/4	19	19	3 3/8	30	19	3 3/8
9	18	3 3/8	20	19	3 3/8	31	19	3 3/8
10	18	4	21	19	3 3/8	32	broken.	
11	18	3 3/8	22	19	3 3/8			

The Standard Tie.

The following letter from Mr. J. W. Clarke, Roadmaster Chicago & Western Indiana and Belt Railway of Chicago, has been sent to us. It was written to the Standard Metal Tie and Construction Co.:

Answering your inquiry of 19th inst. as to the condition of the Standard steel ties now in our track on main line north of 71st street, I beg to say that these ties were laid on the first of October, 1889, and were put in at the above location for the reason that at this point the ballast is very light gravel, which would make the test much more severe than if they had been put in at another part of the road. The traffic on this section is 80 regular trains in one direction every 24 hours—the heaviest engine being 96,000 lbs., with 15,000 lbs. on each pair of drivers.

So far the ties have given perfect satisfaction, requiring but slight attention, and that only when first laid. There are no loose bolts, clips or nuts, and so far have been none.

It would be impossible for me to estimate correctly at the present time the saving in maintenance, as the ties have not been in service long enough. I believe, however, that there will be a great saving in maintenance, as the only thing to need attention is the bolts and clips, and so far they have shown no indication of weakness in any particular. There has been no upheaval of the ties where the ground is frozen, and from present indications I hardly believe that such will occur. The ties are in good line and surface and hold the rails in an upright rigid position, so that the wear on the rail head seems to be more uniform and even than where wood ties are used. I am free to say that the ties have so far surpassed all my expectations.

There seems to be no possibility of spreading of the rails. Should a rail break there would be less liability to accident for the reason that the fastenings hold the rail absolutely firm and rigid. I believe that the saving in maintenance that will eventually be shown, and the absolute, safe, permanent way which these ties make—to say nothing of their greater life—will show greatly in their favor.

THE SCRAP HEAP.

Notes.

Alonzo Ellison has received the contract to erect a ten-stall round house for the Canadian Pacific at London, Ont.

One hundred and seventy-five men, employed in the Erie shops at Susquehanna, Pa., were laid off last week. Nearly all are single men, and many non-residents.

Three Chinese were killed in the collision at Talmadge, O., a year ago. The railroad company has settled with their heirs in China through the San Francisco consul for \$500 each.

The Atchison, Topeka & Santa Fe is so gratified at having had the privilege of carrying "Nellie Bly" over its road at 75 miles an hour that it has named one of its dining cars after her.

The National House Committee on Commerce has ordered that all bills having in view the repeal of the Interstate Commerce law be reported back to the House with a recommendation that they lie on the table.

The shops of the Huntington & Broad Top road, at Saxton, Bedford County, Pa., were burned lately and a locomotive and three cars in the machine shop were destroyed. The loss is estimated at \$50,000.

Fire in Ottawa, Ont., on Monday last destroyed a car shed belonging to the Canadian Pacific, together with six cars, including Lady Macdonald's private car and the official car "Ottawa." The loss is placed at \$90,000.

The law prohibiting the use of stoves or furnaces in passenger cars goes into effect in Maryland on May 1 next. The Western Maryland has one train fitted up with a continuous system, which it is making a trial of.

A firm of ticket brokers in Kansas City has sent a circular to editors of local papers offering \$15 per thousand miles for editorial mileage tickets of various roads. Tickets "unsigned preferred, but will accept plain, easy signatures." Parties accepting the offer are requested to inclose in each book a number of their business cards.

It is stated that the cars used on the fast mail between New York and Chicago over the New York Central are

no longer required to be painted white. It seems that this absurd requirement came from the Post Office Department. A dirty white freight car is bad enough; such an inappropriate color on a varnished car is positively slovenly.

The American Ticker Brokers' Association has lately been incorporated in Illinois, Ohio, Minnesota, Kentucky, New York and Missouri. The name is the same as that of the well-known older association, whose headquarters are at Louisville. The new association is said to have been started by the brokers who have been unable to get into the other.

The imperial train of the Czar of Russia is lighted by electricity, which is furnished from a complete plant carried in a car by itself. The train consists of 15 cars, and during 1888 it ran upwards of 5,000 miles, and the electric lights always worked well. In the disaster of October, 1888, the electric car escaped uninjured. The lamps are from six to eight candle power.

An agent and a clerk of the Columbus, Sandusky & Cleveland, at Springfield, O., have been discharged for dishonesty and appropriating funds. A system of robbing the company had been practiced by them for two years. The method of operation was to raise the weight of cars on the expense bill to consignees. Just how much was taken cannot be discovered.

Creosoting Works Burned.

The creosoting works of the Southern Pacific Co. at San Pedro were burned about the middle of January. The principal loss is in machinery. The piles and lumber accumulated in the yard were saved. The works have been in operation for about a year, principally on piles for wharves and bridges. It was the intention to remove the machinery shortly to Oakland.

Narrow and Broad Gauges in India.

It is said that Col. Conway Gordon has laid a proposal before the government of India to the effect that keeping up two gauges is a most wasteful proceeding; that endless delay and friction arises in discussing the question of which gauge any new line is to have; that in point of fact there is so little economy in the first cost of the metre gauge that the advantage is invariably lost in working expenses; that it is matter for regret, but a now quite vain regret, that India has not got the same gauge as the 4 ft. 8 1/2 in. that suits the rest of the civilized world so well; that failing 4 ft. 8 1/2 in. there is no salvation for Indian finances in any gauge but the 5 ft. 6 in., but that as a matter of practical politics he reluctantly consents to except certain geographical divisions of India from the operation of what he would else make a universal law compelling all new schemes to adopt the 5 ft. 6 in. gauge *ad infinitum*. Perhaps the very strongest argument of all is the fact that the very administration which has made the metre gauge so much of a success, as it undoubtedly is on the Rajpootana line, is at this moment busily prosecuting the construction of a new line to relieve its congested traffic and making it on the broad (5 ft. 6 in.) gauge.—*Engineering*.

The Forth Bridge.

Arrangements are being made for the opening of the Forth Bridge by the Prince of Wales on March 4. The Board of Trade inspection takes place early in February but owing to the backward state of the Glenfarg Railway regular traffic will not be commenced till June. The Prince of Wales has intimated to Sir John Fowler his desire to drive the last bolt.

Railroads of New South Wales.

This colony has now 2,171 miles of railway, and the gross receipts for the year ended June 30, 1889, were £2,538,477; the expenses amounted to £1,634,002, or 64.39 per cent. of the gross revenue, leaving a net revenue of £903,875, or a return of 3.25 per cent. per annum on total debenture capital outstanding, and 3.14 per cent. per annum on total amount debited against the capital account. The increase in revenue amounted to £243,353, the increase being specially noticeable in live stock and wool. The earnings per train mile amounted to 79.7d., and the expenditure per train mile was 51.34d., leaving a net earning of 28.38d., as against 27.43d. for the preceding year, being an increased profit of 0.95 per train mile. The opening of the bridge over the Hawkesbury River by the Governor, Lord Carrington, on May 1, marked a great event in the railway history of Australia, as it enabled passengers and goods to be conveyed by railway between four of the five capital cities of the colonies of the continent, but it is much to be regretted that, although this is true in regard to the continuous railway system, yet the inconvenience, delay and expense of transshipment has to be suffered by all traffic, owing to the lines having been constructed on three different gauges. The Commissioners urge upon the government the necessity for pressing the question upon the governments of the other colonies, as they feel certain that if the break of gauge is allowed to continue, the consequent inconvenience and cost will in a few years be so great as to render the adoption of a universal gauge imperative and very costly.

The introduction of the system of interlocking the points and signals and the absolute block system of working as in this country is contemplated. The absolute block system is now in force over 132 out of the total 2,171 miles.—*Herald's*.

Railroad Notes from Italy.

A correspondent of a German paper, writing from Rome, comments on Italian railroads and railroad management in an anything but flattering manner. Of all institutions in Italy, he says, railroads have been least developed, falling behind the standard set in any of the European countries, not only as regards comfort and speed, but also safety and systematic management. The fitting up of the passenger cars is very poor, which is true even of the first-class cars. As a consequence of the scarcity of cars the trains are overcrowded, and the return of rolling stock of other railroad companies is frequently delayed for long periods. There are no end of petitions for freight cars by the Genoa Chamber of Commerce, and shippers of goods are often subject to important losses from the insufficient facilities. The failure to run trains on time is a subject of constant press comment, but all efforts to bring about reform in this respect have been fruitless. There are frequent accidents, of which the principal source is, he thinks, to be found in the extensive use of single tracks. Even those roads having the heaviest traffic have double tracks only for short distances. Large sums have frequently been appropriated to remedy this evil, but apparently nothing further has been done. As to the personnel, it is small in number and poor in quality, being very poorly paid. Its efficiency is further impaired by unduly long hours

of service. A large proportion of the accidents is due to careless attendance at switches. Newspaper agitation to bring about improvement has been of no avail. In view of all this, it is gratifying to note that at least one system is about to make trial of the block system.

Uniform Time for Germany.

After a short skirmish in the German Reichstag, occasioned by the opposition of Freiherr von Stumm, it has been decided to adopt the time of the fifteenth meridian as the official time of Germany. This change was demanded by the interests of public traffic, railroads, post-offices, telegraphs, etc., and by the army administration. At present the railroads of Prussia and the Reichland are run by Berlin time, and local time is used for anything else, while in Bavaria, Wurtemberg and Baden Frankfurt time is authoritative for both the railroads and public. Germany is about an hour and eight minutes wide, but the fifteenth meridian is not a medial line, and the extreme divergence will be in the west. The German papers apprehend only a slight trouble from the change on the start, explaining to their readers that the day will still contain as many hours as before, and hope as the fifteenth meridian time is already used in Austro-Hungary, it will be adopted in Switzerland and Italy also. If this is done the times of these four countries will be just an hour earlier than that of London, and this time will also be that of Denmark, Norway and Sweden to the north, and Tripoli to the south, as also of the Congo from its mouth to about the mouth of the Aruwimi.

Texas Railroads.

The report of the Texas state comptroller for the year ended Sept. 30, 1889, shows the total mileage in operation to be 8,151 miles, representing a construction cost of \$346,659,473, on which, in addition to capital stock amounting to \$177,451,000, there was a bonded indebtedness of \$233,869,000. The unpaid coupons on these bonds amounted to \$10,851,585 and the floating indebtedness was \$18,515,227, while the total gross earnings were only \$28,227,927, or about a million dollars less than the unpaid interest and floating debt. The net earnings were \$3,373,333, which is equivalent to less than one per cent. of the cost of construction, or about 1½ per cent. on the capital stock, or less than 1½ per cent. on the bonds, or about 1½ per cent. on a valuation of \$25,000 per mile.

The Port of Vera Cruz.

The harbor at Vera Cruz was formed by a coral reef, on which the historic castle of San Juan de Ulloa stands, and was open to both the north and south. This exposed the harbor to the full force of northerly winds, so that during nearly every winter communication between the shore and ships was impracticable for days at a time. The obvious remedy for this was to close the northern passage between the reef and the main shore. Now that this passage has been closed, complaints arise that the harbor, deprived of the current which heretofore swept through this passage, is filling up with sand, and President Diaz has appointed Mr. George Foot, General Manager of the Mexican railway, and Engineer Miguel A. de Quevedo as engineering experts to make soundings and report on the truth of the complaint.

The Trade of Chicago.

Examinations by the daily press of Chicago have resulted in the publication of the following table, showing the growth of the manufacturing interests of that city during the past year, which is to be understood as an approximation, in the absence of an official census:

	1889.	1888.
Number of firms.....	3,119	2,912
Capital employed.....	\$134,045,000	\$115,680,000
Number of workers.....	151,070	147,036
Wages paid.....	\$84,500,000	\$74,575,000
Value of product.....	\$152,223,000	\$146,871,000

The total trade of Chicago in agricultural produce, wholesale transactions in merchandise and manufactures, exclusive of speculative transactions and dealings in real estate, is estimated by the same authorities as below:

	For 1889.....	For 1888.....
.....	\$20,000,000	\$200,000,000
.....	97,000,000	959,000,000
.....	377,000,000	1,177,000,000

New Railroads in Egypt.

Seven new railroads have been projected for Egypt, the locations having already been determined by the engineers of the public works department. Their aggregate length is 120 miles.

Street Railroads in Rio de Janeiro.

The extended use of street railroads in South America is illustrated, in a measure, by the figures given for Rio de Janeiro. There were, at the close of 1888, about 150 miles of street railroad in the city and its suburbs, requiring, for operation, 5,707 miles and 459 cars. A number of separate companies control the lines, having maintained their independence notwithstanding repeated efforts to effect their consolidation.

Prayers Wanted.

A Des Moines minister applied to the Des Moines & Kansas City Railroad for the customary half-fare permit for the present year. General Manager Newton sent him the following reply:

"It affords me satisfaction to furnish you this one-half fare annual permit for two reasons. First, all railroad men have very little time to devote to their spiritual welfare, and if they did so it is doubtful whether their prayers would be of much avail; we, therefore, ask yours in our behalf, for it is written 'The prayers of the righteous avail much.' Our second reason is that while you are laboring with the zeal and eloquence of St. Paul, when he 'reasoned of righteousness, temperance and judgment to come,' will you kindly remind those of your hearers who hold to the prevailing delusive belief that they can never enter heaven unless they have swindled or robbed some railroad corporation, and teach them they are radically wrong in this belief, and that such acts will not afford a passport to the celestial kingdom, but rather their chance of entrance is greatly enhanced if they do not swindle or rob a railroad."

Fast Freight in Russia.

An extraordinary petition has recently been presented to the Minister of Communications by the directors of the Baskuntchak Railway Company, praying that measures be adopted by the government to prohibit the conveyance of salt by peasants on floats drawn by oxen, "as this kills the goods traffic of the line." In commenting on the above, the *Grashdanin* states that the competition between the railways and oxen is extremely keen, especially in the south of Russia, and that the oxen are actually driving the railroads out of the grain transport business. Huge quantities of the corn shipped from Odessa arrive at that port from the interior, not by rail, but by old-fashioned wagons drawn by bullocks. In this

way, millions of bushels are annually withdrawn from the railroad. The farmers allege that they are forced to act thus by reason of the utter unreliability of the railroad service, and by the damage, loss and delays to which their shipments are exposed at the hands of the railway companies. The latter defend themselves by pleading lack of rolling stock. But the fact is that, however large the number of goods wagons might be, the mismanagement is so colossal that half the rolling stock might be mislaid and not discovered for a generation or two. This is no flight of fancy, but is a statement founded on fact. Some time ago several hundred railroad cars, both for passengers or freight, were casually discovered in one of the distant suburbs of the city, after they had been entirely forgotten for more than ten years. They were standing in an immense field, which was surrounded by a high wooden wall, but without any overhead shelter, and therefore exposed to the action of rain, hail and snow. They had been built some twelve years ago by the firm of Gobleff & Co. for the Rybinsk-Bologofsky Railway, and had been stored there pending some dispute relative to the contract, and had been entirely forgotten by the railroad company. The wooden parts of the cars had rotted, and the moss and grass of ten years growing on the roof gave them the picturesque appearance of a portion of a ruined abbey.—*St. Petersburg Correspondence New York Tribune.*

Lake Superior Iron Ore Production.

The *Mining Journal*, Marquette, prints a table showing the production of each of the Lake Superior mines for the last 13 years and their total productions. The aggregate production for 1889 was 7,292,754 tons, which was about three times that of 1885, and exceeded the production of 1888 by 2,237,343 tons or 44 per cent.

This ore was delivered from 93 different mines, only two of which produced over half a million tons.

The yields of the various ranges were as given below:

Marquette Range.						Total yield of range.
1884.	1885.	1886.	1887.	1888.	1889.	
1,555,033	1,430,422	1,627,383	1,851,717	1,918,672	2,634,817	29,754,057
Menominee Range.						10,416,859
895,634	690,435	880,006	1,199,343	1,191,097	1,796,764	
Gogebic Range.						5,622,191
1,022	119,590	756,237	1,285,265	1,433,689	2,016,391	
Vermillion Range.						2,342,991
62,124	225,484	304,396	394,252	511,933	844,782	
Miscellaneous.						2,320
Totals.						48,128,421
2,518,692	2,466,372	3,568,022	4,730,577	5,055,411	7,292,754	

The Menominee range made its first delivery in 1877, both the Gogebic and Vermillion entering the market in 1884.

On the Indianapolis Division of the Pennsylvania lines is a negro engineer, who has been running since 1873, previous to which time he had been a fireman. On the Rockville branch of the New York & New England is a negro passenger conductor who has seen 15 years' service in that place and 30 years' service on the road. These cases are so exceptional that the newspapers of the country make prominent mention of them.

C. P. Huntington, Vice-President of the Central Pacific, last week appeared before the House Committee on Pacific Railroads, and urged an extension of the time allowed for the Central Pacific Company, and a reduction in the interest to be paid the government, as proposed in the Vandever bill.

A Swindler.

A correspondent wishes to warn our readers against "a very plausible rascal calling himself A. B. Potter, of Denver, Col.," who is going about with his pocket-book full of passes, made out on account of the Atchison, Topeka & Santa Fe, and who borrows money from confiding railroad and supply men.

A Varnishing Room.

In one of the great English carriage building establishments the highest possible degree of care is taken to exclude dust from the room in which the final varnishing is done. A member of the Scripps League writes: "When their vehicle is ready for the final coat of varnish it is sent into the sealed room. The door is locked, and no one is admitted under any circumstances—not even the proprietor. The doors and windows are air tight, so that not a particle of dust can find entrance. And yet the room is ventilated, but how? By means of tubes filled with a mixture of horse hair and wool. This permits air to enter freely, but deprives it of all dust, consequently the finish of their work is perfect and exquisite."—*Master Mechanic.*

Physiognomical Indications of Psychological Characteristics.

The *Minneapolis Tribune*, discussing the alleged order of the Philadelphia & Reading to its passenger brakemen not to wear full beards, philosophizes as below. The division superintendent says, by the way, that this was merely a wish, "not even a request," and that it was complied with by all but three of the men:

"Under the new rule a baggageman or brakeman is not only deprived of the power of mashing, but he is also compelled to give to the world that trustworthy index to the true character afforded by the features. A most villainous phiz may be made to appear gentle and honest by a proper disposition of whiskers. A face that, clean shaven, every one would pronounce the face of a coward may have a fertile upper lip and grow a warlike moustache. Is it strange that those railroaders complained? Under the new order of things, when the brakeman opens his cavernous mouth to yell 'Mxlonigh-trrape!' he has no moustache to deceive, and not a girl on the train will cuddle up toward the window and mutely invite him to be sociable when he swaggers through the train. His villainous mug will give him dead away. And so with the baggageman. The razor having torn away the mask, the lineaments of his countenance will tell of the thousands of trunks he has cruelly mutilated or murdered. Of course the good brakeman and conscientious baggageman won't complain, but they are so few that nobody will know the difference. The superintendent of the Reading has done the public a great service, and his example may be imitated."

How Would "Cheek" Do?

Mr. W. R. Busenbark, General Passenger and Ticket Agent of the Chicago, St. Paul & Kansas City, has opened a correspondence with a number of young ladies whom he does not know, and all of them school teachers. Without waiting for an introduction he has addressed all the members of the National Educational Association and all teachers in the schools of the United States and Canada, who may attend the annual meeting of the National Educational Association at St. Paul in July. In his letter, which is written on heavy parchment paper,

with a crest and monogram, and scented with the essence of maple syrup, Mr. Busenbark says: "The Chicago, St. Paul & Kansas City Road now wants one thing more—an appropriate pseudonym, sobriquet, or nickname which shall, either with or without an accompanying motto, briefly and forcibly indicate to the public some salient and distinctive quality or characteristic of the line. We seek this in the collective knowledge and wisdom of the educational profession, and accordingly offer a prize of \$100 for the best and most appropriate pseudonym or sobriquet, either with or without an accompanying motto, that may be presented by any professional teacher or educator in the United States or Canada within thirty days after the adjournment of the annual meeting of the National Educational Association at St. Paul in July, 1890. As soon thereafter as the company decide upon and adopt the same, the \$100 will be paid to the successful contestant."—*Chicago Paper.*

A Complete Duluth Train.

On Thursday morning, Jan. 30, a train consisting of 15 carloads of flour, appropriately decorated and inscribed with mottoes, started from Duluth over the Duluth, South Shore & Atlantic for a through trip to Boston. The entire train of cars is the product of the iron car works of Duluth, the iron for which was taken from Duluth's mines and the timber from its forests. The flour is the product of the Duluth Imperial Mill, and it was ground from the celebrated Duluth No. 1 hard wheat. Locomotive, caboose and cars were all gaily decorated with flags and banners. The fifteen cars contain about 2,200 barrels of flour. The train will go to Mackinaw on the South Shore, then over the Michigan Central to Buffalo, to Albany over the New York Central, and from there to Boston over the Boston & Albany, reaching its destination about Feb. 12. Five cars of the flour are consigned through to Glasgow. The cars are inscribed with various mottoes and statistical data, among them being "The Great Unsalted Sea to the Salted Sea," "Receipts of Wheat at Duluth for the Last Four Months, 15,422,270 Bushels." This train, says a local paper, will no doubt waken up the sleepers of the effete East to the golden possibilities of the new golden Northwest.

RAILROAD LAW—NOTES OF DECISIONS.

Powers, Liabilities and Regulation of Railroads.

In Illinois the defendant leased certain premises to plaintiffs for a term of 10 years, on which plaintiffs agreed to erect a grain elevator in addition to one they then had, and to furnish defendant with certain elevator facilities at all times during the term. Defendant agreed "that the total amount of grain received at said elevators shall be at least 5,000,000 bushels on an average for each year during the term of this lease, and, in case it shall fall short of that amount," defendant agreed to pay plaintiffs one cent per bushel on the deficiency. The Federal Court rules that defendant was liable for a deficiency in the amount of actual receipts, though it tendered large quantities of grain to plaintiffs, who refused to receive it for the reason that their elevators were full. In Rhode Island the Supreme Court holds that the provisions of a railroad charter authorizing it to construct and maintain its tracks "upon and over such streets in the city," "except in" certain of the streets therein mentioned, "as shall from time to time be fixed and determined by the city council," are not to be construed to prevent the company from laying its tracks "across" one of the excepted streets.

In Texas the Supreme Court holds that where a railroad maintains a road crossing, knowing that such road is in common use by the public, it is liable for injuries caused by defective construction of the crossing, though the road has not been made public by law.

In Arkansas the Supreme Court decides that in a contract by a ferryman to transport all the passengers presented for ferrage by a railroad company, from its terminus to a certain town, in consideration of one-fifth of the gross earnings of the railroad on such passengers, the term "gross earnings" include the entire sums received from such passengers, including the amounts paid to a transfer company to which the railroad has let the contract of hauling its passengers from the terminus to the specified town, where the railroad sells the tickets of the transfer company, and manages it as part of its system.

In New York the plaintiff alleged that the defendant, a foreign railroad, had property in the state, consisting of cars, office furniture, tickets, etc. One O. was described in defendant's list of "officers and agents" as its "general agent, passenger department, 261 Broadway, New York." The windows of 261 Broadway were inscribed with signs indicating that the office is the general office for the general railroad business of defendant. The Court of Appeals rules that it sufficiently appeared that defendant had property in the state, and that O. was its "managing agent," to allow service of summons upon him, under the statute permitting service on a foreign corporation, having property in the state, by leaving a copy of the summons with its "managing agent in the state."

In Pennsylvania the Supreme Court decides that under the statute providing that all mortgages, etc., owned by any person whatsoever, etc., "and all other moneyed capital in the hands of individual citizens of the state," shall be taxed for state purposes, bonds of a railroad company, held in trust by corporations, are taxable in the names of the beneficial owners. Where such bonds are found in the hands of a resident trustee, and the railroad company makes no effort to collect the tax, the bonds will be presumed to be owned by residents of the state in the absence of proof to the contrary.

The Supreme Court of Minnesota rules that an agreement which, by its terms, gives the exclusive right of way to a railroad corporation in or through a certain tract of land, in so far as it attempts to exclude other railroad corporations from acquiring a right of way over the same tract, upon land not appropriated or required for its use by the covenantee, is against public policy, and void.

Carriage of Goods and Injuries to Property.

In Missouri the Court of Appeals rules that where plaintiff's contention is that his horse came upon defendant's track between the head of a switch and a cattle-guard, and the undisputed evidence shows that placing the cattle-guard any nearer the head of the switch would endanger the lives of defendant's employees engaged in switching, plaintiff cannot recover.

In Texas the Supreme Court decides that under the statute providing that railroad companies shall be liable for stock injured or killed on the track by their trains, without regard to negligence, except when the right of way is fenced, where horses attached to a wagon run away, and are injured at a place on the track which was

not fenced nor a public crossing, defendant is liable, without regard to negligence, and is also liable for the injury to the wagon if those in charge of the train could have prevented the injury by ordinary care.⁹

In Missouri the Court of Appeals rules that care and caution on the part of the railroad is no defense under the statute which provides that damages may be recovered for stock killed without any proof of negligence, unskillfulness, or misconduct on the part of the officers, servants or agents of the company.¹⁰

In New York the Supreme Court holds that an owner of land abutting on the Bowery, in New York City, is entitled to easements of light, air and access, including the benefit derivable from the use of the front of his property by the erection of signs thereon, and may recover for injuries to those rights arising from the construction of an elevated railroad on the street.¹¹

In Georgia the Supreme Court rules that the operation of a railroad in the streets of a city does not entitle the owner of property which is damaged thereby to compensation unless special damage is alleged and shown; and for this purpose evidence is admissible to prove that the damage was caused by noise, smoke, dust, and the like; but these must have resulted in actual damage, and not merely in annoyance or inconvenience. The fact that a horse railroad company drove its horses under the lash, causing them to rear and pitch upon the sidewalk in front of plaintiff's premises, to the annoyance of plaintiff and family, is not an allegation of damage to plaintiff's property.¹²

A Kentucky statute provides that if cattle shall be killed on the track of a railroad company "adjoining lands belonging to or in the occupation of the owner of the cattle, who has not received compensation for fencing the land along said road," the loss shall be divided between the railroad and the owner of the cattle. The Court of Appeals holds that the occupant of lands can recover, under this statute, only when neither he nor the owner has been compensated for fencing, and his complaint must allege failure to compensate either.¹³

In Iowa the Supreme Court rules that where it appears that a cattle-guard on defendant's road had become filled and packed with snow so that the plaintiff's horse had walked across it onto defendant's track and was killed, it is not error to charge that it was the duty of the defendant to use ordinary care and diligence to keep its cattle-guards free from snow; and that, if the defendant had notice that the cattle guard was packed with snow, or if, by the exercise of ordinary care and diligence, it could have had such notice, it was its duty to excavate the snow from the cattle-guard within a reasonable time.¹⁴

Injuries to Passengers, Employees and Strangers.

In Virginia the plaintiff was traveling as a stock shipper on a freight train. At the end of a run, on a rainy night, the train stopped just before crossing a bridge where it was customary to detach the caboose in which plaintiff had been riding; he was notified of the intended change, and that he could walk across or ride on the rear freight car; the stop was long enough to enable him to make a change, but he remained in the caboose till it was uncoupled and the train had started, when he went forward with a large valise in hand, and in attempting to climb on the car while in motion, fell through the bridge. The Supreme Court of Appeals holds that he was negligent and cannot recover damages.¹⁵

In New Jersey the Federal Court rules that where a ferry-boat has two gangways by which passengers can leave, a passenger who attempts to leave by the gangway intended for teams, and who is injured by the guard-chain for such gangway being dropped on his leg while he is astride of it, is guilty of contributory negligence and cannot recover.¹⁶

In Minnesota a train going south, on which plaintiff was a passenger, was side-tracked at a station to permit a north-bound train to pass on the main track. The conductor remarked, in his hearing, that they would have to wait for the north-bound train some 20 or 30 minutes, and that there would be time to go to the village near by. Plaintiff went to the village, and on his return, after an absence of about 15 minutes, hearing the conductor cry "All aboard," started on a run for his train, and in crossing the main track was struck by the north-bound train. Plaintiff neither looked nor listened for the north-bound train, although for the last 100 ft. of the distance which he ran the view in the direction of such train was unobstructed. The Supreme Court decides that plaintiff was guilty of negligence, and could not recover.¹⁷

In New York the Court of Appeals rules that in an action against a railroad company for injuries to plaintiff caused by a gate, maintained by defendant across a city street, striking her where it appears that the gates did not begin to fall until plaintiff had passed the first gate, and the accident occurred in a populous city on a dark, rainy night, it is proper to leave to the jury the question whether plaintiff's omission to look before passing the second gate constituted contributory negligence.¹⁸

In Illinois the plaintiff approached a railroad crossing with a wagon and team, without stopping his team before crossing the track, and was struck and injured. The wagon was old and made considerable noise and he knew that a train was due about that time, and there were obstructions in his view of the track. The Supreme Court holds that he was not guilty of negligence, as matter of law.¹⁹

In Iowa the Supreme Court rules that it is not negligence for a railroad company to employ an inexperienced youth of 22 years as brakeman, where there is nothing to show that he was not physically and mentally qualified to learn and perform the duties of a brakeman.²⁰

In Missouri the Supreme Court holds that one employed by a cable-car company to watch at a curve in the track, and signal trains to stop or to continue on, so that they will not meet at the curve, is a fellow-servant with the gripman of a motor car, so as to exempt the company from liability for the death of the watchman, caused by the negligence of the gripman.²¹

In Michigan an experienced head brakeman was ordered to get a car from a side track. He noticed, as the engine approached in accordance with his signal, that the draw-bar of the car had fallen, and was too low; he tried to lift the bar with his knee, and, failing to lift it high enough, its edge slipped on the edge of the draw-bar of the car attached to the engine, and his hand was caught and crushed; if he had looked before the cars came together he could have seen the defect and stepped out, but as it was he had time only to make the coupling as well as he could. He had a lantern on his right arm, and made the coupling with his left hand. The company had given him a printed order that each employee, before exposing himself to danger, must examine all machinery, cars, etc., satisfying himself that they are safe, and that he should take sufficient time for such examination, and should refuse to obey orders exposing himself to danger. He was acting under no orders as to the manner or time

of coupling. The Supreme Court holds the railroad not liable.²²

In Georgia the Supreme Court rules that an employee, though obligated in writing, as terms of his employment, to "study the rules governing employees, carefully keep posted, and obey orders," is not bound by rules, as such, of which he is ignorant, and which have never been promulgated to him by the company.²³

- ¹ Hoyt v. C. M. & St. P. R. Co., 39 Fed. Rep., 415.
- ² State v. N. S. R. Co., 18 Atl. Rep., 161.
- ³ Mo. Pac. v. R. Co. Bridges, 12 S. W. Rep., 210.
- ⁴ D. & R. R. Co. vs. Shenn, 12 S. W. Rep., 183.
- ⁵ Tuchband v. C. & A. R. Co., 22 N. E. Rep., 360.
- ⁶ Tom. v. L. V. R. Co., 18 Atl. Rep., 406.
- ⁷ Kettle Riv. R. Co. v. East. R. Co., 43 N. W. Rep., 409.
- ⁸ Pearson v. C. B. & K. C. R. Co., 33 Mo. App., 543.
- ⁹ G. C. & S. F. R. Co. v. Keith, 11 S. W. Rep., 1117.
- ¹⁰ Courgill v. H. St. J. R. Co., 33 Mo. App., 677.
- ¹¹ Mortimer v. N. Y. E. R. Co., 6 N. Y. (Supp.), 898.
- ¹² Campbell v. M. S. R. Co., 9 S. E. Rep., 1,078.
- ¹³ L. & N. R. Co. v. Belcher, 12 S. W. Rep., 195.
- ¹⁴ Graham v. C. St. P. & K. C. R. Co., 43 N. W. Rep., 529.
- ¹⁵ R. & D. R. Co. v. Picklesimer, 10 S. E. Rep., 41.
- ¹⁶ Graham v. Penn. R. Co., 39 Fed. Rep., 595.
- ¹⁷ De Kay v. C. M. & St. P. R. Co., 43 N. W. Rep., 182.
- ¹⁸ Feeney v. L. I. R. Co., 22 N. E. Rep., 402.
- ¹⁹ C. & I. R. Co. v. Lane, 22 N. E. Rep., 513.
- ²⁰ Gorman v. M. & St. L. R. Co., 43 N. W. Rep., 303.
- ²¹ Murray v. St. L., C. & W. R. Co., 12 S. W. Rep., 522.
- ²² Karrer v. D. G. H. & M. R. Co., 43 N. W. Rep., 379.
- ²³ Carroll v. E. T. V. & G. R. Co., 10 S. E. Rep., 163.

General Railroad News.

MEETINGS AND ANNOUNCEMENTS.

Dividends.

Dividends on the capital stocks of railroad companies have been declared as follows:

- Cincinnati, New Orleans & Texas Pacific*, 4 per cent., payable Feb. 18.
- Denver & Rio Grande*, 1½ per cent. on the preferred stock, payable Feb. 20.
- Illinois Central*, semi-annual, 3 per cent. in cash, payable March 1.
- Kansas City, Ft. Scott & Memphis*, 2 per cent. on the common stock and 4 per cent. on the preferred stock, payable Feb. 15.
- Kansas City, St. Louis & Chicago*, 1½ per cent. on the preferred stock, payable Feb. 1.
- Lake Erie & Western*, 1 per cent. on the preferred stock, payable Feb. 14.
- Louisiana & Missouri River*, 3½ per cent. on the preferred stock, payable Feb. 1.
- New York, Providence & Boston*, quarterly, 2½ per cent., payable Feb. 10.
- St. Louis & San Francisco*, semi-annual, 2 per cent. on the first preferred stock, payable Feb. 10.
- Wheeling & Lake Erie*, quarterly, 1 per cent. on the preferred stock, payable Feb. 14.

Meetings.

Meetings of the stockholders of railroad companies will be held as follows:

- Cincinnati & Springfield*, annual, Central Union Depot, Cincinnati, O., Feb. 19.
- Cumberland Railway & Coal Co.*, annual, Montreal, P. Que., Feb. 13.
- Delaware, Lackawanna & Western*, annual, 26 Exchange Place, New York City, Feb. 28.
- Denver, Texas & Fort Worth*, special, Denver, Col., Feb. 20, to act upon a proposed consolidation with the Union Pacific system in Colorado.
- Illinois Central*, annual, Chicago, Ill., March 12.
- Indianapolis, Decatur & Western*, special, Indianapolis, Ind., Feb. 18.
- Kansas City, St. Louis & Chicago*, annual, 511 Olive street, St. Louis, Mo., March 11.
- Manhattan Elevated*, special, 71 Broadway, New York City, Feb. 20.
- Missouri Pacific*, annual, St. Louis, Mo., March 11.
- New York, Susquehanna & Western*, annual, 15 Cortlandt street, New York City, Feb. 27.
- St. Louis, Iron Mountain & Southern*, annual, St. Louis, Mo., March 11.
- Southwestern (Ga.)*, annual, Macon, Ga., Feb. 13.
- Western Counties*, annual, Yarmouth, Nova Scotia, Feb. 12.

Railroad and Technical Meetings.

Meetings and conventions of railroad associations and technical societies will be held as follows:

- The *International Association of Ticket Agents* will hold its next semi-annual meeting at the Hotel St. James, Jacksonville, Fla., Feb. 11.
- The *Master Car Builders' Association* will hold its next annual convention at Old Point Comfort, Va. Rooms should be secured of Mr. F. N. Pike, manager, Hygeia Hotel, Fortress Monroe, Va.
- The *New England Railroad Club* meets at its rooms in the United States Hotel, Beach street, Boston, on the second Wednesday of each month, except June, July and August.
- The *Western Railway Club* holds regular meetings on the third Tuesday in each month, except June, July and August, at its rooms in the Phenix Building, Jackson street, Chicago, at 2 p. m.
- The *New York Railroad Club* meets at its rooms, 113 Liberty street, New York City, at 7:30 p. m., on the third Thursday in each month.
- The *Central Railway Club* meets at the Tift House, Buffalo, the fourth Wednesday of January, March, May, August and October.
- The *Northwest Railroad Club* meets on the first Saturday of each month in the St. Paul Union Station at 7:30 p. m.
- The *American Society of Civil Engineers* holds its regular meeting on the first and third Wednesday in each month, at the House of the Society, 127 East Twenty-third street, New York.
- The *Boston Society of Civil Engineers* holds its regular meetings at Boston, at 7:30 p. m., on the third Wednesday in each month. The next meeting will be held at the American House.
- The *Western Society of Engineers* holds its regular meetings at its hall, No. 67 Washington street, Chicago, at 7:30 p. m., on the first Tuesday in each month.
- The *Engineers' Club of St. Louis* holds regular meetings in St. Louis on the first and third Wednesdays in each month.
- The *Engineers' Club of Philadelphia* holds regular meetings at the house of the Club, 1123 Girard street, Philadelphia.
- The *Engineers' Society of Western Pennsylvania* holds regular meetings on the third Tuesday in each month, at 7:30 p. m., at its rooms in the Penn Building, Pittsburgh, Pa.

The *Engineers' Club of Cincinnati* holds its regular meetings at 8 p. m. on the third Thursday of each month at the Club rooms, No. 24 West Fourth street, Cincinnati.

The *Civil Engineers' Club of Cleveland* holds regular meetings on the second Tuesday of each month, at 8:00 p. m., in the Case Library Building, Cleveland. Semi-monthly meetings are held on the fourth Tuesday of the month.

The *Engineers' Club of Kansas City* meets at Kansas City, Mo., on the first Monday in each month.

The *Engineering Association of the Southwest* holds regular meetings on the second Thursday evening of each month at 8 o'clock, at the Association headquarters, Nos. 63 and 64 Baxter Court, Nashville, Tenn.

The *Civil Engineers' Society of St. Paul* meets at St. Paul, Minn., on the first Monday in each month.

The *Montana Society of Civil Engineers* meets at Helena, Mont., at 7:30 p. m., on the third Saturday in each month.

The *Civil Engineers' Club of Kansas* holds regular meetings on the first Wednesday in each month at Wichita, Kan.

Association of American Railway Accounting Officers.

The Association of American Railway Accounting Officers held its semi-annual meeting at New Orleans on Jan. 22 and 23. There was a very good attendance. Mr. M. Riebenack, the President of the Association for the current year, presided.

The Executive, Standing Freight and Standing Passenger Committees presented reports, which evidenced the fact that they had done much painstaking work during the six months which have elapsed since the July meeting. These reports were taken up in their order and discussed by the convention, and some important questions unanimously agreed upon, including the adoption of some standard blanks to be used in interline passenger business. Interesting papers were read by Messrs. G. M. Taylor, Auditor Freight Receipts, Pennsylvania Railroad; W. Randall, Freight and Ticket Auditor, Burlington & Missouri River, and A. McElevy, Auditor Freight Receipts, Pennsylvania Company. The Association has already done much towards the establishment of uniform methods in matters relating to the joint business of railroads. Its membership has steadily increased, until it now numbers 272 members, representing 183 railroads, and embracing the largest systems in the country.

Various committees were appointed at the meeting, one of which is to take up the question of nomenclature in railroad accounting, with a view to the adoption of long-needed reforms in this direction. The next meeting of the Association will be at Cape May, N. J., in the early part of July next. It will be the annual meeting, at which officers will be elected for the ensuing year.

Engineers' Club of Philadelphia.—Arches in Embankments.

A regular meeting was held Jan. 18, 1890. President H. W. Spangler in the chair; 12 members and two visitors present. The secretary presented for Mr. Charles S. Churchill an illustrated paper on the Economical Form and Construction of Arches in Railroad Embankments. In his letter transmitting his paper, the author says: "The data upon which this paper is based, the general facts and the plans referred to, were collected and prepared three years ago. My investigations of this subject started with a query of mine as to how much of an increase should be given to the thickness of the key of a deeply buried arch over that of an arch located in a low bank. I made some very careful experiments as to the actual pressure of a pile of earth upon a small buried object representing an arch. Notwithstanding that a number of engineers have from time to time claimed that the actual pressure on such a body is that of a wedge-shaped mass, whose base is the width of the body receiving the pressure, I found, nevertheless, that the actual pressure in loose material was the weight of a prism of earth, the base of which was the area of the body and the height that of the bank."

"Proceeding with this investigation to determine the proper thickness of keys for different spans under banks of various heights, I found that the full centre arch is not the most economical form for a buried arch, as noted in this paper, and the true form was then determined."

"The proper form of arch bridges of larger spans and under light banks was next taken up; and as pressure of business interfered with the completion this part of the subject, I have always considered my work unfinished. "In regard to the so-called false skew arch, I have only to refer inquirers to a number of good examples on the Pennsylvania Schuylkill Valley Railroad north of Hamburg, spans being from 12 ft. to 55 ft., end skew to barrel of arch from 50 degrees to 80 degrees."

"As to the cost of arch masonry, I have only to state that some of these arches were not undertaken until I was able to furnish proof that a first-class iron girder would not be materially cheaper."

There was considerable discussion of this paper and of arches in general, none of which has yet been put in writing.

Engineers' Society of Western Pennsylvania.

At the December meeting of this society, Mr. Alfred C. Hunt read a paper on stone used for structural purposes in Allegheny County, Pa., which was discussed by Mr. Max J. Becker, Mr. J. Brashen, and others. Mr. Hunt stated that large buildings in Pittsburgh are being built almost entirely of granite, sandstone or brick, which materials are especially applicable for Pittsburgh. Limestone and marble very soon deteriorate in the acid atmosphere of the vicinity. He does not know of a single large building in that district made of limestone or marble. Mr. Hunt discusses at considerable length the qualities of the various kinds of stone used in that vicinity and the qualities requisite for enduring structures, both for general and local reasons. His paper closes with the hope that he will see aluminum castings used in ornamental castings, fronts and buildings, as this metal is readily molded and will hold its lustre without tarnishing.

Mr. Becker said that while it was a matter of regret that that part of the country produces so little stone for structural purposes, there was this advantage, that a great variety of architecture is produced. He mentioned one stone not alluded to in Mr. Hunt's paper which has never received the attention which it really deserves and which is gradually coming into use. That is oolitic limestone from central Indiana. He has used it very freely for bridge work, and considers that it has no superior, unless it may be in very expensive kinds of granite and marble. It occurs in a massive ledge varying from 30 to 70 ft. in thickness, free from the stratified partings which characterize other limestone, and may be quarried in blocks of any form or size required. It possesses great strength and elasticity, works freely, cuts in clean

lines, and is susceptible of high polish. When sawed its modulus of rupture is 2,338; compression, 12,675; elasticity, 4,889,480. When tool pressed its modulus of rupture is 1,477; compression, 7,857; elasticity, 2,679,475.

PERSONAL.

—Mr. Joseph Robinson, who has been Receiver of the Scioto Valley, has been appointed General Superintendent of the line.

—Mr. Henry J. Kenah, for many years Master of Transportation of the Cumberland & Pennsylvania, died suddenly of apoplexy, Jan. 26, at his home in Mt. Savage, Md., at the age of 62 years.

—Mr. Edward S. Goodman, Chief Clerk in the freight department of the Chesapeake & Ohio, has resigned to accept the appointment of Freight and Passenger Agent of the Savannah, Americus & Montgomery.

—Mr. Henry Snyder, General Manager of the Union Switch & Signal Co., is lying seriously ill at his home near Pittsburgh, with a chronic complaint of the liver, which has troubled him more or less in times past.

—Mr. H. C. Boughton, Trainmaster of the Wabash, has been appointed Superintendent of the Pittsburgh & Western, to succeed Mr. C. E. Doyle, resigned, to become Division Superintendent of the Chesapeake & Ohio.

—Mr. H. G. Krake, General Agent of the Atchison Topeka & Santa Fe, at Denver, Col., has resigned to accept a position as General Live Stock Agent of the Missouri Pacific with headquarters at St. Louis.

—Mr. E. D. Bronner, General Foreman of Car Repairs of the Michigan Central, at Detroit, has been appointed Master Car Builder. This will relieve Mr. Robert Miller, Assistant General Superintendent, who has been Master Car Builder also, of part of his duties.

—Mr. J. R. Billinton, chief locomotive draughtsman to the Midland, of England, has been appointed to succeed the late Mr. Stroudley as Locomotive Superintendent of the London, Brighton & South Coast. Mr. Billinton was originally in the service of the Brighton.

—Mr. John O. Ewan, Superintendent of the Indianapolis Division of the Cleveland, Cincinnati, Chicago & St. Louis road, has tendered his resignation, and J. Q. Van Winkle, Superintendent of the St. Louis Division, has been placed in charge of both the St. Louis and Indianapolis divisions.

—Mr. William Thornburgh, General Manager of the Valley (Ohio) road, has been appointed General Agent of the line, it having passed into the control of the Baltimore & Ohio. Mr. J. T. Johnson, formerly Superintendent of the Pittsburgh & Western, has been appointed General Superintendent.

—Mr. D. L. Bush, Superintendent of the Southern Minnesota division of the Chicago, Milwaukee & St. Paul, has been appointed Superintendent of the Hastings & Dakota division to succeed the late Mr. Edson H. Graves. Mr. Wilbert Irwin, Superintendent of the Iowa & Minnesota Division, succeeds Mr. Bush as Superintendent of the Southern Minnesota Division.

—Mr. W. J. Haylow, Superintendent of the Savannah & Western division of the Central of Georgia, has resigned, and Mr. D. D. Curran, Superintendent of the South Carolina, has been transferred to succeed him. Mr. J. H. Averill, recently Superintendent of the South Carolina road, has been appointed Superintendent of the South Carolina division of the Central of Georgia, to succeed Mr. Curran.

—Mr. J. T. Harahan has resigned as General Manager of the Chesapeake & Ohio. He has held this position since last March. Mr. Harahan had been General Manager of the Louisville & Nashville for several years, when he resigned in December, 1888, to become Assistant General Manager of the Lake Shore & Michigan Southern. He resigned the latter position to go to the Chesapeake & Ohio.

—The resignation of Maj. Campbell Wallace from the State Railroad Commission of Georgia was announced last week, and Col. J. W. Robertson, of Clarksville, was appointed his successor. Major Wallace is 84 years old and has been on the commission ever since it was created, and the law provides for at least one practical railroad man on the commission, which consists of three, and Wallace has been the railroad expert. Col. Robertson has been out of the railroad business for several years. Colonel Trammell was chosen Chairman of the Commission.

—Mr. William H. Turner, Superintendent of the New York & New Haven Division of the New York, New Haven & Hartford, died Jan. 31, at New Rochelle, N. Y., of pneumonia, after a short illness, aged 54 years. When 17 years of age he entered the office of the Norwich & Worcester at Worcester. From freight clerk he succeeded his brother as agent, and later became Freight Agent and afterward Superintendent of the Portland & Rochester. He resigned the latter position to become Superintendent of the Boston & New York Air Line, now a part of the New York, New Haven & Hartford system. In 1877 he became General Agent of the Norwich & New York Transportation Co. in New York City, and in 1884 accepted the position of Superintendent of the Eastern Division of the New York & New England, being shortly after promoted to the General Superintendency of the road. He continued in that position until May 1, 1887, when he accepted the position held at the time of his death.

ELECTIONS AND APPOINTMENTS.

Alabama Midland.—Hardin Miller has been appointed General Freight and Passenger Agent, with headquarters at Montgomery, Ala.

Alton, Venice & St. Louis.—The following officers of this recently chartered company were elected at a meeting in Alton last week: President, Z. B. Job; Secretary, H. J. Bowman; Treasurer, Z. B. Job, Jr.; Executive Committee: Z. B. Job, R. E. Mills, F. McCambridge, John Wedig, W. Elliot Smith.

Burlington & Missouri River.—J. R. Phelan has been appointed Superintendent of the Black Hills Division, extending from Ravenna, Neb., to Newcastle, Wyo., with headquarters at Alliance, Neb. E. F. Highland succeeds J. R. Phelan as Assistant Superintendent on the Cheyenne line, with headquarters at Holyoke, Neb. E. Zook, of the Western Division, Roadmaster on the line between Akron and Denver, has been made Trainmaster and Roadmaster on the Southern Division, with

headquarters at Nebraska City, to succeed E. F. Highland. Allen B. Smith has been appointed Assistant General Freight Agent, with office at Omaha, Neb.

Burlington, Stillwater & St. Paul.—The incorporators of this Wisconsin company are O. Swanson, W. Kennehan, Adolph Drechter, William Drechter, Jr., and G. Holcomb.

Carolina, Cumberland Gap & Chicago.—At the annual meeting of the road held in Aiken, S. C., the following Board of Directors were elected: George A. Evans, George C. Evans, Austin Gallagher, George A. Searles, J. Hugh Peters, Benjamin Watson, Charles F. Avery, New York; John Gary Evans, T. G. Croft, Aiken, S. C.; Lewis Jones, Edgefield, S. C., and Hon. J. S. Corteran, Abbeville, S. C.

Central of Georgia.—D. D. Curran has been appointed Superintendent of the Savannah & Western division, with office at Columbus, Ga., to succeed W. J. Haylow, resigned. J. H. Ayerill succeeds Mr. Curran as Superintendent of the South Carolina division, with office at Augusta, Ga. Joseph Flourney has been appointed Roadmaster of the Southwestern division, with office at Macon, Ga.

Chesapeake & Ohio.—Charles E. Doyle has been appointed Superintendent of the Peninsula, Richmond, and James River Divisions, vice I. G. Rawn, resigned, to accept service with another company.

The headquarters of George S. Sipp, Car Accountant, have been moved from Cincinnati to Richmond, Va.

Chicago, Burlington & Quincy.—H. F. Hilton, Superintendent of the Galesburg division, having resigned, E. M. Herr, Superintendent of the St. Louis division, has been appointed to fill the vacancy, with office in Galesburg, Ill.

F. J. Allen, Division Engineer of the Galesburg division, has been appointed Roadmaster of the Chicago division, to succeed W. B. Troop, appointed Chief Engineer of the Hannibal & St. Joseph.

Chicago, Milwaukee & St. Paul.—The following appointments have been made: D. L. Bush, to be Superintendent of the Hastings & Dakota Division, with office in Minneapolis, to succeed E. H. Graves, deceased. W. Irwin, Superintendent of the Southern Division, with headquarters at Austin, Minn., to succeed D. L. Bush, promoted. J. B. Cable, Superintendent of the Iowa & Minnesota Division, with office at Minneapolis, to succeed W. Irwin, promoted. James Gibson, Assistant Superintendent of the Iowa & Dakota Division, with office at Mason City, Ia., to succeed J. B. Cable, promoted.

Cincinnati, New Orleans & Texas Pacific.—The official announcement of the appointment of Richard Carroll as General Manager, vice John C. Gault, resigned, was issued Jan. 31, on which date the appointment took effect. The position of General Superintendent has been abolished.

Cleveland, Cincinnati, Chicago & St. Louis.—John O. Ewan, Superintendent of the Indianapolis Division, having resigned, J. Q. Van Winkle, of the St. Louis Division, will on Feb. 1 be placed in charge of both the St. Louis and Indianapolis divisions, with headquarters at Indianapolis.

Columbus, Hocking Valley & Toledo.—John S. Patterson, formerly Master Mechanic of the Cincinnati, Indianapolis, St. Louis & Chicago, has been appointed Superintendent of Motive Power, with office at Columbus, O.

James T. Boothroyd has been appointed Assistant Secretary of the road, with office in New York City.

Cumberland & Washington.—The following are the incorporators of this Maryland company: Enoch Pratt, David L. Bartlett and John Hambleton, of Baltimore, Md.; Asa Wilson, of Cumberland, Md.; Martin Rohrbach, of Frederick, Md.; E. K. Johnson, of Washington, D. C., and H. A. Talbot, of Montgomery County, Md.

Denver, Texas & Fort Worth.—J. L. A. Thomas has been appointed General Agent at Dallas, Tex.

Dueth, St. Cloud, Mankato & Southern.—The stockholders have elected the following Board of Directors: J. A. Willard, John Cooper, H. H. Carson, W. H. Turlford, D. B. Smith, E. Cross, William Greenleaf, John Murphy, P. L. Atwood, J. E. Hayward, M. D. Colletter, D. E. Meyers, D. Young, A. J. Henderson, L. T. Scott, G. T. Barrand, F. Hall. The Board of Directors elected John Cooper President; D. B. Smith, Vice-President; George F. Barr, Secretary, and H. H. Carson, Treasurer.

Elmira, Cortland & Northern.—C. W. Williams has been appointed Acting General Passenger and Freight Agent, to succeed George F. Randolph, appointed General Freight Agent of the New York & New England.

Fort Worth & Rio Grande.—A. K. Dixon has been appointed Auditor of this company, with office at Fort Worth, Tex., to succeed A. L. Robinett.

Galveston & Western.—William Davis has been appointed Superintendent, with headquarters in Galveston, Tex.

Georgia Pacific.—At a meeting held in Birmingham Ala., Jan. 27, the following directors were elected: John W. Johnston, Birmingham; George J. Gould, John H. Inman, George S. Scott, John H. Rutherford, J. C. Mahen, John G. Moore, New York; Calvin S. Brice, Ohio, and Joseph Bryan, Richmond, Va. Joseph Bryan was elected President.

H. C. Ansley has been appointed Auditor of the Georgia Pacific, in the place of James E. Starke, resigned to accept another position. His office will be at Birmingham, Ala.

Granite.—The following directors were elected at a recent meeting of the stockholders: William B. Sewall, John Leighton, John F. Osgood, William B. Williams, George F. Greene, Frederick S. Davis and Henry B. Osgood. William B. Sewall was elected President and John W. Leighton Vice-President and J. Albert Simpson Clerk and Treasurer.

Great Northern.—The circular announcing the change of the name of the St. Paul, Minneapolis & Manitoba to the above was issued Jan. 31 over the signatures of President J. J. Hill, of the Manitoba; President H. D. Minot, of the Eastern Minnesota, and President C. A. Broadwater, of the Montana Central. The following appointments have been made: A. L. Mohler, General Manager; C. H. Warren, Controller; W. S. Alexander, General Traffic Manager; P. P. Shelby, Assistant General Traffic Manager. These officers have authority in their respective fields over the Great Northern Railway (St. Paul, Minneapolis & Manitoba, leased), Eastern

Railway of Minnesota, Montana Central Railway, Willmar & Sioux Falls Railway, Duluth, Watertown & Pacific Railway. The name "Great Northern Railway Line" is applied to the whole system.

Gunpowder Valley.—The incorporators are: George W. Hoffman, William E. Hoffman, J. A. Frederick, Charles Zeigler, J. D. Shearer, George M. Fully and John W. Hoffman.

Hannibal & St. Joseph.—W. B. Troop, Roadmaster of the Chicago, Burlington & Quincy, Chicago division, has been appointed Chief Engineer, with office at Hannibal, Mo., to succeed E. J. Blake, resigned to accept other service.

Illinois Central.—W. D. Hurlbut has been appointed Assistant General Freight Agent of the lines north of the Ohio River and east of the Mississippi River, with headquarters at Chicago.

Kansas City & Southwestern.—The stockholders of the company recently re-elected the following directors: George J. Gould, of New York; S. H. H. Clark, George C. Smith, D. S. Smith and F. G. Merriam, all of St. Louis.

Lake Shore & Michigan Southern.—J. E. Childs having resigned the position of Assistant General Manager, the duties pertaining to that office will hereafter devolve upon the General Superintendent, P. P. Wright.

Louisville & Nashville.—The office of District Passenger Agent at Montgomery, Ala., has been abolished, and James C. Lord has been made Passenger Agent at that point.

Louisville, New Orleans & Texas.—R. F. Reynolds, Commercial Agent, has been appointed Assistant General Freight Agent of the company, with headquarters at New Orleans.

Massillon & Cleveland.—At the annual meeting of the road, held in Massillon, O., Feb. 4, the following directors were elected: Louis H. Meyer and Charles W. Cass, New York; John Sherman, Mansfield, O.; P. G. Albright, Massillon, O.; J. N. McCullough, John J. Haley and William F. Robb, Pittsburgh, Pa. The following officers were elected: L. H. Meyer, President, and John J. Haley, Secretary and Treasurer.

Michigan Central.—E. D. Bronner has been appointed Master Car Builder of this company, with office at West Detroit, Mich.

Midland Pacific.—The stockholders met at Sioux Falls, S. D., Jan. 31, and elected S. L. Tate, President; Delos Beech, of Maine, Secretary; George L. Shoup, of Boise City, Vice-President, and James Sampson, of Sioux City, Treasurer. The directors are, Senator R. F. Pettigrew, George L. Shoup, George Nix, of Dubuque; J. C. Barton, Joseph Sampson, Delos Beech, Clinton Ferguson, S. L. Tate and J. M. Bailey, Jr.

Minneapolis, St. Paul & Sault Ste. Marie.—W. M. Kellie, at present Superintendent of the Minnesota division of the road, will hereafter act as Assistant to the General Manager, with office in Minneapolis.

Monterey & Mexican Gulf.—J. J. Ryan has been appointed General Material Agent for this road, with headquarters at Laredo, Tex.

Newburg, Dutchess & Connetquot.—The company has elected the following directors: Gen. John S. Schultz, Manchester, N. J.; Lebbous B. Warr, Jersey City; William S. Eno, William N. Sayers, Pine Plains; Robert G. Coffin, Coffin's Summit; George Gotter Billings, Albert Emans, La Grange; Charles L. Kimball, Fishkill-on-Hudson; H. B. Willis, Madison, N. J.; Samuel L. Wright, Elizabeth, N. J.; R. C. Van Wyck, Hopewell; Norman T. Plass, Copake Iron Works; William Lumis, New York. Gen. J. S. Schultz was elected President and Treasurer; William A. Wells, Secretary, and C. L. Kimball, Superintendent.

New York Central & Hudson River.—C. C. Crane has been appointed Pacific Coast Agent, with office in San Francisco, to succeed W. S. Baldwin, resigned.

New York, Lake Erie & Western.—The following appointments have been made: J. Deuel, Division Freight Agent, to be Assistant General Freight Agent, with office at No. 177 Main street, Buffalo, N. Y., and in charge of the traffic on the Western, Buffalo & Southwestern, and Bradford divisions, and the Niagara Falls branch of the Buffalo division. H. B. Chamberlain, Freight Claim Agent, to be Assistant General Freight Agent, with office at No. 21 Cortlandt street, New York City, with charge of the freight claim department.

Northern Pacific.—The lines of the Cœur d'Alene Railway & Navigation Co. will hereafter be known as the Cœur d'Alene division of the Northern Pacific. F. W. Gilbert, Superintendent in Charge, has been made Division Superintendent, under the jurisdiction of the Assistant General Superintendent at Helena.

Ohio, Indiana & Western.—W. J. Hayes has been appointed Master Car-Builder of the road, with headquarters at Indianapolis, Ind.

Ohio & Mississippi.—A. B. Barnard has been appointed Claim Agent, with office in Cincinnati.

Ontario, Carbondale & Scranton.—The stockholders of the company have re-elected the old Board of Directors, and the following officers: President, Edward R. Sturges, of Scranton; Vice-President and General Manager, James E. Childs, of New York; Secretary and Treasurer, John Fleming, of New York; Assistant Treasurer, Chas. R. Pitcher, of Scranton, Pa.

Philadelphia & Reading.—F. W. Stone has been appointed Assistant General Freight Agent of this company, with office in Philadelphia. H. C. Tucker has been appointed General Western Agent, with office at 305 Rookery Building, Chicago, Ill., vice H. A. Snyder, resigned.

Pittsburgh & Lake Erie.—J. B. Yohe, Chief Train Dispatcher, has been appointed Master of Transportation, and J. H. Crawford has been appointed Chief Train Dispatcher, with offices in Pittsburgh.

Pittsburgh, McKeesport & Youghiogheny.—At the annual meeting of stockholders in Pittsburgh, Jan. 28, these directors were elected: President, J. H. Reed; Directors, Cornelius Vanderbilt, William K. Vanderbilt, Hamilton McK. Twombly, James Tillinghast, John Newell, James M. Bailey, James I. Bennett, M. W. Watson and Henry Rice.

Pittsburgh & Western.—H. C. Boughton has been appointed Superintendent, with office at Allegheny, Pa.

Richmond & Danville.—H. C. Ansley has been appointed Assistant Auditor and Assistant Treasurer of the Georgia Pacific Division of the Richmond & Danville, with office at Birmingham, Ala., in the place of James E. Starke, resigned to accept another position. He will have charge of the Accounts and Disbursements pertaining to new construction.

Roncoverte, Lewisburg & Coal Knob.—E. T. Haines, of New York, L. S. Williams, H. T. Bell, John A. Preston and John A. Handley, of Lewisburg, W. Va., are the incorporators of this West Virginia company.

St. Louis, Keokuk & Northwestern.—W. C. Maxwell has been appointed General Agent, with headquarters at Keokuk, Ia., with charge of the freight and passenger business from Alexandria to Burlington, Ia., and from Keokuk to Mount Pleasant, Ia.

St. Louis Transfer Co.—At the annual election of officers held last week the following were re-elected: President, R. P. Tansey; Vice-President, J. M. Thompson; Manager, S. H. Klinger; Secretary and Auditor, B. M. Tansey; Treasurer, G. B. Walls.

St. Louis, Venice & Alton.—The following were named as incorporators in the charter filed in Alton this week: John H. Overall and Alfred Carr, of St. Louis; Jerome Winstanley, of New Brighton; George W. Locke and James K. Ewing, of East St. Louis; E. E. Rutledge, of Alton, and Henry M. Needles, of Belleville, Ill.

San Francisco & North Pacific.—At a meeting of the stockholders of the company, held Jan. 21, the following directors were elected for the ensuing year: James M. Donahue, President; Philip N. Lillenthal, Vice President; Alfred L. Seligman, Treasurer; S. G. Murphy, Solon Pattee, G. W. Prescott and Louis Sloss, Jr.

Tulobottom & Western.—The company has been incorporated by W. H. Little and T. E. Blanchard, of Columbus; J. H. Pitts, of Waverly Hall, Ga.; J. B. Parker, of Prattsburg, and others.

Texas & Atlantic.—The incorporators are W. B. Ward and J. H. Bemis, of Jefferson; E. Rand, of Dallas, and J. H. Smelser, W. L. Whitaker, H. C. Hynson, and William Buchanan, of Texarkana, Tex.

Texas & Pacific.—Leroy Trice, Roadmaster, has been appointed Superintendent of the Eastern Division, with headquarters at Marshall, Tex., to succeed John Bradley, resigned. M. Summers has been appointed General Roadmaster, with headquarters at Marshall, Tex., to succeed Leroy Trice.

Tuckahoe & Cape May.—Morris Boney and Charles W. Potts, of Philadelphia; Michael J. Kelly, of Sea Isle City, N. Y., and others are incorporators of this New Jersey road.

Tuscaloosa Belt.—The annual meeting of the stockholders of the company was recently held in Tuscaloosa, Ala., and the following directors were elected: W. C. Jemison, B. Friedman, Dr. P. Bryce, J. A. Kennedy, W. G. Cochran, J. S. Rainey, N. Bowling, J. C. Andrews, and W. F. Boffinger. W. C. Jemison was elected President, G. Searcy, Treasurer; G. P. Ayres, Secretary and Superintendent.

Union Pacific.—In addition to his duties as General Passenger Agent of the Denver, Texas & Fort Worth, George Ady will have charge of the passenger business of the Colorado division of this system, with headquarters at Denver, Col.

W. H. Hurlburt, General Western Passenger Agent of the New York, Lake Erie & Western at Chicago has been appointed Assistant General Passenger Agent, with office at San Francisco, vice J. B. Kirkland, resigned.

Valley (Ohio).—The following appointments have been made and will take effect at once: William Thornburgh, General Agent and Assistant to the President; J. T. Johnson, General Superintendent; J. B. Caven, General Freight and Passenger Agent, vice R. A. Carran, resigned; James Bartol, Auditor. The general offices will remain at Cleveland.

Wabash.—Harvey Dunlap has been appointed Superintendent of Bridges and Buildings, with office at Andrews, Ind., vice J. B. Mitchell, resigned.

Walden Valley.—The following officers have been elected: President, Gen. A. J. Warner, Marietta, O.; Secretary, W. R. Pomeroy, Coshocton, O.; Chief Engineer, J. A. Hanlon, Canton, O.

Waynesburg & Washington.—At the annual meeting of the road, held in Pittsburgh, Pa., the following directors were elected: President, G. B. Roberts; Directors, J. N. McCulloch, T. D. Messler, James McCrea, J. T. Brooks, William Mullins, J. J. Brooks, J. N. Du Barry, J. F. Temple, W. T. Lautz, Jacob Swart, W. S. Bryson, and Abner Thorp. The following officers were elected: Vice-President, Thomas D. Messler; Secretary, S. B. Lizzett, and Treasurer, John E. Davidson.

Worcester, Nashua & Rochester.—At the recent annual meeting the stockholders re-elected the old Board of Directors for the ensuing year. The directors elected James P. Cook, of Salem, President, in place of Charles A. Sinclair, who resigned on account of private business. T. W. Hammond, of Worcester, was re-elected Clerk and Director, the Hon. E. B. Stoddard, Auditor.

OLD AND NEW ROADS.

Alabama Midland.—Track is being laid on the gap of 12 or 15 miles between Troy and Sprague Junction, Ala., and the work will be finished early next week. The bridge over the Chattahoochee River, near Gordon, will be erected by Feb. 10. The entire road from Bainbridge to Montgomery will then be completed.

Allegheny Valley.—In the United States Circuit Court at Pittsburgh, Pa., a petition was presented Feb. 1, asking for the sale of this road. The petitioners represent about \$2,500,000 of the income bonds of the road. They complain that in 1884 the road was declared insolvent, in consequence of a suit against it by the Pennsylvania. A receiver was appointed who has since been in charge. It is alleged that during the administration of the receiver the indebtedness has been increased from \$31,117,829 to \$38,459,089. The court fixed March 14 as the date for hearing arguments on the motion.

Anniston & Atlantic.—In an interview in an Alabama paper, Mr. Milton H. Smith, Vice-President of the Louisville & Nashville, is quoted as saying that this road and the Anniston & Cincinnati will hereafter be operated by the Louisville & Nashville. The gauge will

be changed to standard, and an extension will possibly be built.

Atchison, Topeka & Santa Fe.—The modifications in the proposal for the stock trust provide that if a vacancy occurs in the trust during the period of its existence it is to be filled by the remaining trustees. The limit of time has been changed so that instead of the trust extending to July 1, 1900, it is now made to expire July 1, 1895. The trust will be declared effective when at least 300,000 shares of stock have been deposited; before such declaration has been made, but not afterward, any stock trust certificates may be surrendered and the stock represented by them be withdrawn. Application will be made to have the trust certificates listed in Boston, New York and London, so that they shall be salable at all times.

Bellingham Bay Railway & Navigation Co.—The road is now in operation from Whatcom, Wash., northwards about 10 miles to the Nooksack River, across which a bridge will soon be built. A locating survey is being made from the Nooksack River north to the international line, about 10 miles.

Birmingham Mineral.—The double track from Birmingham to Graces Gap, Ala., has been completed, as has also the double track between Oxmoor and Boyles, Ala., 10 miles. The Red Gap branch has been turned over to the operating department.

Burlington, Stillwater & St. Paul.—This road, whose incorporation was referred to last week, is to extend from St. Croix easterly to the village of Emerald, thence southerly through Woodville to Wildwood, in St. Croix County; thence in a southerly direction through the counties of Dunn, Pepin and Pierce to a point on the Mississippi River at Pepin. The road is to be 125 miles in length.

Canadian Pacific.—The earnings of the company for the month of December, 1879, were \$516,723, being an increase of \$98,052 over the corresponding month of the previous year. The total gross earnings for the year to Dec. 31 were \$15,030,600, and the operating expenses \$9,024,601, leaving the net earnings \$6,006,059, as compared with \$3,870,774, the net earnings for the year 1878, an increase of \$2,135,284.

Cape Girardeau Southwestern.—The towns of Alton, Mo., and Monmouth Springs, Ark., have offered the company free right of way through Oregon County, Mo., and Fulton and Sharp Counties, Ark., for an extension from the present terminus at Hunter southwest to Alton and Monmouth Springs, a distance of about 50 miles.

Cariboo.—Application has been made to the British Columbia legislature for an act to incorporate this company to construct a line from a point on the Canadian Pacific, near Kamloops, in a northwesterly direction to Bakerville, in the district of Cariboo.

Cerdan Valley.—The grading on this Mexican road has been completed from the city of Mexico to San Angel and the tracklaying has been finished as far as Mixcoac. Tracklaying is progressing slowly on account of the delays in the delivery of material.

Choctaw Coal & Railway Co.—The company has opened for traffic 40 miles of the eastern division of the road from South McAlester, Indian Ter., on the Missouri, Kansas & Texas, east to La Fourche Maline. The grading has been completed east of this point for some distance to a point near Cavanal, on the St. Louis & San Francisco. Cavanal is 15 miles west of the Arkansas state line, and grading is to be continued east from that town into Arkansas. The road is to be built from McAlester west to Fort Reno, on the Chicago, Rock Island & Pacific, but on this division little work has yet been done.

Columbia, Newberry & Laurens.—As was anticipated in our issue of Jan. 17, the iron bridge across the Broad River, near Columbia, S. C., was completed last week. Tracklaying was begun Feb. 3, and will be continued to Newberry.

Cumberland & Washington.—Organized at Rockville, Montgomery County, Md., to build a railroad from Cumberland, Md., to Washington, D. C., and to acquire the Chesapeake & Ohio Canal for the roadbed. Enoch Platt, John Hambleton, of Baltimore, and others of Baltimore are incorporators.

Delaware, Lackawanna & Western.—The preliminary report of this company for the year ending Dec. 31 shows:

	1880.	1888.	Inc. or Dec.
Gross earn.....	\$38,247,621	\$43,232,422	-\$4,984,801
Oper. expen.....	30,653,585	33,456,135	-2,802,550
Net earn.....	\$7,594,035	\$9,776,287	\$2,182,252
Int. and rentals.....	5,222,375	5,218,419	+ 3,956
Balance.....	\$2,371,660	\$4,467,867	-\$2,096,207
Betterments.....	225,577	967,605	-742,028
Balance.....	\$2,145,083	\$3,500,262	-\$1,355,179
Div. 7 per cent.....	1,834,000	1,834,000	.....
Surplus.....	\$314,083	\$1,666,262	-\$1,352,179
Earned on stock.....	8 20 p. c.	13 35 p. c.	.....
Coal transported, tons.....	7,790,560	9,661,717	-1,861,157
Decrease.....			

Denver, Texas & Fort Worth.—At a meeting of the certificate-holders in New York City this week, 137,550 shares, or over three-quarters of the capital stock, voted in favor of the consolidation into the Union Pacific, Denver & Gulf, and instructed the Mercantile Trust Co. to cast the vote of the deposited shares in favor of the plan at the meeting to be held in Denver on Feb. 20. This meeting was the last of the series required to be held to perfect legally the union of the companies to be merged under the name of the Union Pacific, Denver & Gulf, under guarantees of the Union Pacific similar to the latter's agreement with the Oregon Short Line. Only the formal details now remain for the completion of the consolidation.

Drummond County.—The company has filed a bill at Ottawa for authorization to build a branch from a point on its present line between Drummondville and Nicolet, P. Q., through the counties of Nicolet, Lotbiniere and Levis to South Quebec.

Duluth & Winnipeg.—This company has filed at Duluth, Minn., a mortgage for \$7,000,000 to the Guarantee Loan & Trust Co., of Philadelphia. The funds thus acquired are to be used to complete the road to Winnipeg.

Empire & Dublin.—The locating survey will soon be commenced for the extension from Hawkinsville west to

a connection with the Georgia Southern & Florida, about 15 miles. The work on the extension will be light, the material being mostly sand. There will be two iron bridges. The contracts for grading will probably not be let before April 1. R. S. Payne, 89 Ransom street, Atlanta, Ga., is Chief Engineer.

Fairhaven & Southern.—Four trains are now running daily between Fairhaven, on Bellingham Bay, and Sedro W., on the Skagit River, a distance of 25 miles. The New Westminster & Southern is graded from New Westminster, B. C., to the international boundary line, 25 miles, and half the distance between the boundary line and Fairhaven is being graded. Two ships will soon arrive with rails for the northern end of the line.

Genesis & Obed River.—A few miles of this road were built last year, and it is intended to let the contract for building the remaining distance between Sunbright, on the Cincinnati Southern, and Bon Air, Tenn., in a short time. The line is narrow gauge. The surveys were made last fall. Capt. Lina Beecher, of Genesis, Tenn., is President.

Georgia, Carolina & Northern.—A preliminary survey was completed to Atlanta, Ga., some weeks ago. Another survey is now being made from Athens, Ga., and has been run through Jug Tavern to Lawrenceville. The distance from the latter place to Atlanta is about 97 miles. Seventy-five miles of the road is now completed from Monroe, N. C., toward the Savannah River, and the road is under contract to the latter point. The contracts may be let this month for that section between the Savannah River and Athens, where the company has an office.

Georgia Pacific.—On the Tallahassee branch there has been 12 miles of track laid from Itta Bena, Miss., north, and the grading has been finished for a distance of 40 miles north of that point. The survey for the extension of the branch to Helena will be completed this week, and the contracts for building the branch to that place may be let shortly after.

Grand Rapids & Lake Michigan.—A reconnaissance has been made of this recently chartered road by Chief Engineer McLaughlin from Grand Rapids, Mich., west via Holland and Saugatuck and south along the east shore of Lake Michigan through Douglas, Ganges and South Haven to Benton Harbor.

Gulf, Shreveport & Kansas City.—Caddo Parish, La., has voted this company a five-mill parish tax for ten years on the assessed valuation, \$100,000 in cash, to be levied by a five-mill tax on the part of the city of Shreveport, right of way through the city and parish and necessary land for buildings. The road is projected from a point in Arkansas through Caddo parish and Shreveport to a point on the Gulf of Mexico, near Sabine Pass.

Harrisburg Terminal.—The mayor of Harrisburg, Pa., has signed the ordinance giving the company the right to build an elevated road over a certain portion of that city, and also to erect a bridge across the Susquehanna River. The road is to connect with the Lebanon Valley branch of the Philadelphia & Reading road at Harrisburg, and will extend west to Bowmansdale, Pa., on the Harrisburg & Potomac, which connects at Shippensburg with the Western Maryland, and the latter with the Baltimore & Ohio, at Hagerstown, Md.

Hornellsville, Condersport & Westport.—A charter has been granted to this company in Pennsylvania, with a capital stock of \$400,000, to build a line 40 miles long, from Westport, Clinton County, to a point in Potter County, known as Hou Back. N. J. Peck, of Condersport, is President.

Indiana & Illinois Southern.—The sale of the road was made Feb. 4, at auction, by the Master in Chancery at Indianapolis, Ind., under order of the Court. The property was sold to W. K. Alley for \$100,000, and it is to remain under the old management.

Iowa Central.—The company proposes to abandon the 38 miles of track between Lyle and Mason City, Ia. At Lyle a connection is made with the Chicago, St. Paul & Kansas City.

Jacksonville Southeastern.—A receiver has been appointed for this road on the application of suitors, who have an unpaid judgment of \$53,000 against the road, payment of which is refused.

Kennebec Central.—The greater part of the grading between Randolph and Togus, Me., five miles, has been finished. M. O. Neil, the contractor, has been unable to complete the work, and by an agreement with the company, his contract has been cancelled.

Kingston & Pembroke.—The company has filed plans at Ottawa for a new line between Harrowsmith and Sydenham, Ont., and asked for their approval and for permission to build the line. This is opposed by the Nanawee, Tamworth & Quebec, which has filed plans for a line between the same points.

Knoxville & Northeastern.—Ground was broken on this line Jan. 27 at a point about one mile east of Knoxville, Tenn. The road is to be built east to Dandridge, in Jefferson County.

Lake Manitoba.—The provisional directors of this company are petitioning for power to extend the line northerly between Dauphin Lake and Duck Mountain, Man., and by Swan Lake to the Saskatchewan River.

Louisville & Nashville.—The locating survey is in progress for the extension from Clarksville to Dickson, Tenn., 30 miles. An officer of the company is quoted as saying that grading will begin during the present month.

Louisville Terminal.—A bill to incorporate the company is before the Kentucky Legislature. The company asks power to construct a road from a point on the Ohio River in the city of Louisville to a point on the western line of Jefferson County. The incorporators are George L. Danforth, T. C. H. Vance, J. C. Fawcett and P. T. Downs.

Michoacan & Pacific.—This Mexican road will shortly be opened for freight and passenger traffic from Maravatio to Angangueo, Las Trojes and intermediate stations. Freight is now being received for transportation. George G. Baird, Las Trojes, state of Michoacan, is General Manager, and L. R. Gordon, Maravatio, Michoacan, is General Superintendent.

Middle Georgia & Atlantic.—About seven miles of the grading has been finished between Machen and Eatonton, Ga., and work is still in progress on the remain-

ing eight miles. Over a mile of track has been laid from Machen. The grading is expected to be finished in 30 days, and the ballasting done and the rolling stock delivered by April 1.

Missouri, Kansas & Texas.—The Cleott committee on reorganization announces that the time for depositing securities under its plan has been extended to March 1, without penalty. After that date, general mortgage income bonds will pay a penalty of 2 per cent, and the stock 1 per cent. Up to date holders of over \$18,000,000, or 65 per cent of the general mortgage bonds, have deposited with the Central Trust Co., and the holders of 185,000 shares of stock have deposited their shares and paid the first installment of the assessment of 10 per cent. The deposits of general mortgage bonds are in excess of the amount called for by the plan, and as the trustees of both that mortgage and of the consolidated 7 per cent. bonds are thoroughly in accord, the foreclosure of both mortgages will be pushed rapidly.

Montreal & Sorel.—This road will be sold at public sale March 28 next. It extends along the south side of the St. Lawrence River from Montreal to Sorel, P. Q., about 45 miles.

Mount Auburn & Taylorville.—This company has been incorporated in Illinois to build a road from Taylorville north to Mount Auburn, Christian County, a distance of 15 miles. The capital stock is \$50,000. The incorporators are residents of Mount Auburn, Taylorville and Springfield. The principal office of the company will be at Taylorville.

New Roads.—Charles D. Hains, of Kinderhook, N. Y., is a member of a construction company which proposes to build 18 miles of a proposed road from Beaumont north to Jasper, Tex., a total distance of 64 miles. The lumber mill men interested in the construction of the line have promised to build 30 miles, and the company has asked the towns to build the rest, Jasper 10 miles and Beaumont six miles.

Another survey is to be made for the proposed road from Marlboro to South Sudbury, Mass., on the Central Massachusetts. The line is six miles long. The route already surveyed has a total rise of 248 ft., 75 ft. of this being on the first mile out of Marlboro. The estimated cost of the line is \$17,000 per mile. The subscriptions to the stock of the company amount to \$105,000. Henry C. Hancock, of Hudson, Mass., is Chief Engineer.

Norfolk & Western.—Proposals for the grading, masonry, and cross ties on the Ohio extension, from Elkhorn, W. Va., to Ironton, O., a distance of 195 miles, will be received until Feb. 26. All bids are to be made on forms provided by the company. The work on the foundations and masonry of the Ohio River Bridge near Ceredo will aggregate 12,000 cubic yards of masonry. The bridge will have five piers and one abutment. Profiles, general plans and specifications may be examined at the office of the Chief Engineer, W. W. Coe, Roanoke, Va.

Northern Pacific.—A survey was begun last week for a new line from Renton, Wash., near Seattle, on the Puget Sound Shore road, recently acquired by the Northern Pacific, to the international boundary. The proposed road will follow the shore of Lake Washington and cross the Snoqualmie branch of the Seattle, Lake Shore & Eastern at the north end of Lake Washington, and from that point it practically parallels the Seattle, Lake Shore & Eastern to the international boundary. Branches will probably be surveyed to Bellingham Bay and Ship Harbor. The air line distance from Seattle to the international boundary is about 100 miles, but the route now being surveyed is much longer than this.

The following appointments have been made: W. G. Pearce, General Purchasing Agent, with office in St. Paul, to succeed J. H. Ames, resigned. A. S. Morton, Auditor of Disbursements, to succeed W. G. Pearce, promoted. George Sherriff, Auditor of Traffic Receipts.

Oley Valley & Lehigh.—This road, referred to two weeks ago, is projected to extend from Birdsboro, Pa., to Rittenhouse Gap, a distance of 21 miles, where it connects with the Catasauqua & Foglesville road, thus making a short line between the Schuylkill and Lehigh valleys. The route passes through a rich farming country and reaches several iron mines. The road has been chartered for some years, and there is now some prospect of its being built, although as yet nothing definite has been done. George Brooke, of Birdsboro, is President.

Oregon Railway & Navigation Co.—Antonelle & Doe, who have the contract for the grading and bridge work on the branch from La Grande to Elgin, Or., 20 miles, are preparing to begin work in two or three weeks.

Philadelphia & Sea Shore.—The directors propose to build a branch to Ocean City, N. J., if subscriptions amounting to \$30,000 are made to the capital stock of the company. A committee has been appointed to endeavor to raise the required sum.

Pittsburgh, Akron & Western.—W. V. McCracken & Co., of 40 Wall Street, New York City, have the contract for building the line between Carey and Akron, Ohio, about 110 miles. The Cleveland & Western, with which the line connects, is to be widened to standard gauge between Carey and Delphos, and contracts for this work will soon be let. William Semple, of Allegheny, Pa., is President of both roads; John H. Semple, of Granville, Ohio, is Chief Engineer.

Pittsburgh, Fort Wayne & Chicago.—Frederick K. Gwinnes, of Allegheny, Pa., has the contract for double tracking this road from a point five miles west of Lima, O., to Delphos, a distance of nine miles.

Quebec & Boston Air Line.—The Committee on Railroads of Quebec has approved a bill to incorporate this company. The road is to be constructed from Line Ridge, in the County of Wolfe, through the counties of Wolfe, Megantic, Lotbiniere and Levis to the town of Levis. The capital stock of the company is to be \$1,000,000.

Rio Grande Southern.—The company claims that contracts for building the road will be let about March 1. The maximum grades are 4 per cent, and the maximum curves are 20 degrees. The route is from Dallas via Placerville, Telluride, Rico and Dolores, and Cortez to Durango, Colo. Otto Mears, of Silverton, Colo., is President and C. W. Gibbs, of Dallas, is Chief Engineer.

Ronceverte, Lewisburg & Coal Knob.—This company has been granted a charter in West Virginia to build a road from Ronceverte to Grafton, W. Va. The capital stock is \$3,000,000, and the principal office is at Lewisburg, W. Va.

St. Louis & Chicago.—Under decree of the United States Court, at Springfield, Ill., the 10 miles of road extending from Litchfield to Mt. Olive, part of this line which was recently purchased by F. C. Hollins and others, was sold Feb. 5 by the Master in Chancery. It was bid in by the purchasing trustees for the bondholders. A cash payment of \$15,000 was made, the balance to be paid this month. The principal creditors are the Mercantile Trust Co. and the American Loan & Trust Co. of New York, for \$50,000 and \$1,100,000 respectively. The balance due on the sale of the main portion of the road, amounting to \$438,000, over which there was so much contention, was also paid Feb. 5, and the deed was turned over to the North & South Railroad Co., which will hereafter operate the road.

St. Louis, Fort Scott & Wichita.—This road was sold at Topeka, Kan., Feb. 4, by order of the United States Circuit Court at public sale. The Union Trust Co. of New York was the purchaser. The price paid was \$6,406,742, the amount of the first mortgage held by the trust company against the road. The only other bidder was a representative of the Missouri Pacific. By this sale a second mortgage, held by Dillon & Sage, of \$1,274,228, is entirely wiped out.

St. Louis & San Francisco.—The General Manager was waited on last week by a committee from Springfield, Mo., who urged a southern extension of the Chadwick Branch, from Chadwick, 35 miles south of Springfield, to Boone County, in northern Arkansas. The branch would reach lead and zinc deposits. Another delegation from Denison, Tex., asked for a branch from Kasom, Indian Terr., southwest to Denison. Nothing definite was promised by the company concerning the building of either line.

San Antonio & Aransas Pass.—Regular passenger and freight trains are now running to Lexington from West Point, Tex. From Waco trains are running to Chilton, 20 miles south. The tracklaying is nearly completed to Rockdale, 18 miles north of Lexington. This leaves only a short distance between Rockdale and Chilton to complete the entire division.

Scioto Valley & New England.—This company was chartered at Columbus, O. Feb. 1, to succeed the Scioto Valley, which was sold for \$3,565,000, and the outstanding indebtedness. A mortgage for \$5,000,000 has been authorized and the deed recorded. The capital stock is \$5,000,000.

Southern Pacific Co.—The annual statement of the Southern Pacific Co. for 1889 shows a small increase in net earnings; but other causes, among which is the construction of new lines, decrease the surplus to \$1,344,256, against \$2,588,854 for 1888. The gross earnings from railroad and steamship lines for the past year were \$16,146,100; total expenditures, \$14,801,894. The business throughout the northern part of California, in Oregon and on the Atlantic system of the Southern Pacific Co. shows an improvement for the year. It is stated that of the \$451,104 expended in betterments and additions payable by the lessee, which includes new stations, \$350,000 has gone to the Central Pacific lines.

Tacoma, Orting & Southeastern.—Eight miles of track on this new Washington line has been completed from Orting, and construction work will be resumed in the spring.

Texas & Atlantic.—The company has filed articles of incorporation at Austin, Tex., to build a road from Texarkana, Tex., via Dangertield, Linden, and Kildare to Shreveport, La. It is reported that the company has secured the control of private lumber lines in Eastern Texas aggregating 50 miles of road, and that these lines will be connected and form a considerable part of the road.

Texarkana & Fort Smith.—The State of Texas has authorized the company to issue bonds to the extent of \$4,000,000.

Toledo, Columbus & Cincinnati.—The tracklaying on the southern extension from Findlay, O., has been completed to Kenton, 23 miles, through Arlington and Dunkirk. Regular train service will probably begin before Feb. 20, although it may require a longer time to do the ballasting. Construction work south of Kenton to Columbus, 52 miles, will be pushed at once. From Kenton the road will pass through Mt. Victory, Byhalia and York to Marysville, New California and Dublin to Columbus.

Tuckahoe & Cape May.—The company has been incorporated in New Jersey to build a road about 25 miles long between the points named. The capital stock is \$400,000. Charles W. Potts, of Philadelphia, and other directors of the Philadelphia & Sea Shore line, are directors of this company.

Wilmington & Northern.—The company will build a short line from Lenape Station to West Chester, Del., if \$60,000 is secured by the Board of Trade of the latter town to aid in building the road, which will cost about \$150,000.

TRAFFIC.

Traffic Notes.

Chairman Walker, of the Inter-state Commerce Railway Association, has authorized the Chicago, St. Paul, Minneapolis & Omaha to join the Minneapolis, St. Paul & Sault Ste. Marie in through freight rates from Boston to Nebraska points, which are the same as those via Chicago. The rate from St. Paul westward must not be less than the rate from the Mississippi River via the more southerly routes.

A joint committee of the Board of Directors of the Chamber of Commerce and of the Shippers and Receivers' Association, of Cincinnati, has recommended the establishment of a freight bureau, to encourage trade and to prevent discrimination against Cincinnati; to have at its head a competent railroad man, familiar with rates, classification and business requirements.

The Interstate Commerce Commission has dismissed the complaint made by John Livingston against the Erie and Lackawanna roads for issuing free passes to the families of officers and employees. The Commission states that the matter may be brought up at some future time for investigation. As to whether passes to be used only within the limits of one State are lawful under the

Interstate Commerce Act, the Commission states no decision has been reached.

The managers of the Southern Interstate Association have in a measure settled the difficulty over Texas grain rates by ordering a restoration of the flour and grain tariff from Missouri and Kansas points to all Texas common points, including Houston and Galveston. The new rate will be 51 cents on flour and 46 cents on grain of all kinds. The old rates were 53 cents on flour and 48 cents on grain. The cut rates were 35 cents on flour and 30 cents on grain. The new tariff will go into effect Feb. 15.

The Chicago Freight Bureau of the Board of Trade has decided to file a complaint with the Interstate Commerce Commission against the lake transportation companies and the trunk line railroads charging them with violations of the law. The specific charge against the boat lines is that they issue through bills of lading in connection with the trunk lines while refusing to publish a through tariff of rates. The trunk lines are accused of disregarding the law in accepting less than their local rate from Buffalo on through business received from the boat lines, for the reason that no joint tariff is published.

The disagreement between the Boston & Albany and the Fitchburg concerning westbound passenger fares, which resulted in a mild rate war a few months ago and which was referred to arbitration, has just been settled. The arbitrators, Messrs. Taylor, of the Richmond & Danville; Charlton, of the Chicago & Alton, and Lomax, of the Union Pacific, awarded the Fitchburg a differential of \$2 for each first-class passenger by the West Shore and \$3 for each one by the Erie. The New York & New England sells at the same rate via the Erie as does the Fitchburg. The Boston & Maine's differential via Canadian Pacific or Grand Trunk is \$3.

The Chicago, Burlington & Northern has given notice that it will reduce freight rates between Chicago and St. Paul to the basis of 40 cents first class on local shipments and to 30 cents on those coming from the east. Chairman Faithorn has replied to the notice with a remonstrance, in which he says:

"I cannot conceive how rates such as you suggest are necessary to protect your business. Even if the rates have been cut, as stated by you, such a schedule as you propose goes away beyond anything that has occurred in this direction. I would call your attention to the fact that your communication containing notice of your desire radically to reduce the rates is the first that I have received from you regarding the alleged acts of your associates."

Consolidation of Car Heating Companies.

The interests of the Standard Car Heating and Ventilating Co., Pittsburg, Pa., have been consolidated with those of the Consolidated Car Heating Co., of Albany. Mr. George Westinghouse, Jr., and Mr. C. H. Jackson, President and Vice-President of the former company, have become directors and shareholders in the consolidated. The consolidated company thus comes in control of various patents and devices for heating, ventilating, regulating heat, and lighting cars by electricity. As our readers know, this company controls the patents of the former Sewall and McElroy companies.

Receipts of Milk and Cream at New York.

With a view to aiding the milk producers in their movements for getting increased prices, the New York Tribune has procured from the various railroads and steamboat lines centering in New York City, Brooklyn and Jersey City the following data in relation to the quantities of milk and cream received in the cities named. The figures are official and cover the last six months of 1889.

	Milk No. of qt. cans.	Milk in Cases reduced to 40 quart cans.	Cream No. of 40 quart cans.	Condensed milk reduced to 40 quart cans.
N. Y., Sus. & Western.....	262,256	1,976	8,899	.....
N. Y., N. H. & Hart.....	189,195	13,087	27	.....
New York & Northern.....	195,519	6,689	.....	.....
N. Y., Ontario & West.....	315,610	578	16,215	.....
Central of New Jersey.....	58,069	.....	2,404	.....
West Shore.....	201,170	.....	12,871	.....
N. Y., L. E. & West.....	794,042	.....	25,016	6,286
Del., Lac. & Western.....	179,695	.....	690	.....
Long Island.....	62,825	3,927	.....	.....
New York & Harlem.....	391,340	.....	452	13,238
New York Central.....	67,746	.....	219	7,523
Hudson River boats.....	290,246	.....	18,649	.....
New Jersey boats.....	19,398	.....	.....	.....
Milk dealers (wagons).....	29,000	.....	.....	.....
Western condensed milk.....	.....	.....	.....	41,993
Total.....	3,056,141	26,257	85,442	69,040

East-bound Shipments.

The shipments of east-bound freight from Chicago by all lines for the week ending Saturday, Feb. 1, amounted to 95,269 tons, against 106,076 tons during the preceding week, a decrease of 10,807 tons, and against 54,183 tons during the corresponding week of 1889, an increase of 41,086 tons. The proportions carried by each road were:

	W'k to Feb. 1.		W'k to Jan. 25.	
	Tons.	P. c.	Tons.	P. c.
Michigan Central.....	10,243	10.8	13,984	13.2
Wabash.....	7,672	8.0	4,968	4.7
Lake Shore & Michigan South.	20,149	21.2	20,824	19.6
Pitts., Ft. Wayne & Chicago...	9,532	10.0	12,157	11.5
Chicago, St. Louis & Pitts.....	10,209	10.7	8,714	8.2
Baltimore & Ohio.....	8,956	9.4	10,787	10.2
Chicago & Grand Trunk.....	11,636	12.2	12,453	11.7
New York, Chic. & St. Louis...	7,847	8.2	9,217	8.7
Chicago & Atlantic.....	9,025	9.5	12,972	12.2
Total.....	95,269	100.0	106,076	100.0

Of the above shipments 8,954 tons were flour, 50,356 tons grain, 2,508 tons millstuffs, 6,293 tons cured meats, 5,361 tons lard, 9,433 tons dressed beef, 945 tons butter, 1,546 tons hides, 1,705 tons wool and 2,716 tons lumber. The three Vanderbilt lines together carried 40.2 per cent. of all the shipments, while the Pennsylvania lines carried 20.7 per cent.